

**UNDERMINING MERCURY PROTECTIONS: EPA EN-
DANGERS HUMAN HEALTH AND THE ENVIRON-
MENT**

HEARING
BEFORE THE
SUBCOMMITTEE ON OVERSIGHT AND
INVESTIGATIONS
OF THE
COMMITTEE ON ENERGY AND
COMMERCE
HOUSE OF REPRESENTATIVES
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¹The report has been retained in committee files and also is available at <https://docs.house.gov/meetings/IF/IF02/20190521/109556/HHRG-116-IF02-20190521-SD004.pdf>.

²The report has been retained in committee files and also is available at <https://docs.house.gov/meetings/IF/IF02/20190521/109556/HHRG-116-IF02-20190521-SD006.pdf>.

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UNDERMINING MERCURY PROTECTIONS: EPA ENDANGERS HUMAN HEALTH AND THE EN- VIRONMENT

TUESDAY, MAY 21, 2019

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:00 a.m., in room 2322, Rayburn House Office Building, Hon. Diana DeGette (chair of the subcommittee) presiding.

Members present: Representatives DeGette, Kennedy, Ruiz, Kuster, Sarbanes, Tonko, Clarke, Peters, Guthrie (subcommittee ranking member), Burgess, McKinley, Griffith, Brooks, Mullin, Duncan, and Walden (ex officio).

Also present: Representative Soto.

Staff present: Kevin Barstow, Chief Oversight Counsel; Jeffrey C. Carroll, Staff Director; Waverly Gordon, Deputy Chief Counsel; Judy Harvey, Counsel; Chris Knauer, Oversight Staff Director; Brendan Larkin, Policy Coordinator; Jourdan Lewis, Policy Analyst; Jon Monger, Counsel; Alivia Roberts, Press Assistant; Tim Robinson, Chief Counsel; Nikki Roy, Policy Coordinator; Jen Barblan, Minority Chief Counsel, Oversight and Investigations; Mike Bloomquist, Minority Staff Director; S. K. Bowen, Minority Press Assistant; Jordan Davis, Minority Senior Advisor; Brittany Havens, Minority Professional Staff Member, Oversight and Investigations; Peter Kielty, Minority General Counsel; Ryan Long, Minority Deputy Staff Director; Brannon Rains, Minority Staff Assistant; and Natalie Sohn, Minority Counsel, Oversight and Investigations.

Ms. DEGETTE. The Subcommittee on Oversight and Investigations will now come to order.

Today, the Subcommittee on Oversight and Investigations is holding a hearing entitled “Undermining Mercury Protections: EPA Endangers Human Health and the Environment.”

The purpose of today’s hearing is to examine the Environmental Protection Agency’s recent proposal that says limiting mercury and other toxics from coal- and oil-fired power plants is not, quote, “appropriate and necessary” under the Clean Air Act.

The Chair will now recognize herself for purposes of an opening statement.

OPENING STATEMENT OF HON. DIANA DeGETTE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF COLORADO

Today, we take a look at the Trump administration's ill-conceived and, to me, frankly, mind-boggling effort to undermine the U.S. Environmental Protection Agency's rule that limits mercury emissions from our Nation's coal power plants.

Mercury is one of the most toxic substances on the planet, and it's one that causes real harm to the brain, heart, and other essential body systems. Despite the dangers that toxic metals can cause, for years there were no Federal regulations limiting how much mercury that our coal-fired power plants could emit into the atmosphere each year.

Let me be clear about something. When the EPA fails to enact clean air protections, it's our communities, it's our families and our environment that all pay the price. And when an administration like today's administration tries to unravel the protections that we have gotten, it puts all of us at risk.

In 2012, to address this issue and better protect the public from the threat posed by mercury emissions, the Obama administration determined that it was, quote, "appropriate and necessary" under the Clean Air Act to limit how much mercury coal power plants could emit each year. The Obama administration finalized these new standards in a new rule enacted that year known as the Mercury and Air Toxic Standards, or MATS. In justifying its decision to enact these new limits, the Obama administration estimated, while it would cost industry more than \$9 billion to comply with the new rule, the new standards would generate \$4 million to \$6 million direct health benefits and as much as \$90 billion in additional health benefits each year by reducing people's exposure to the toxic metal.

Now, the industry chose to challenge the standards in court, but they were left in place during the court challenge. The industry eventually moved forward and invested billions of dollars in new technology and pollution controls to comply with these standards. And the investments the companies made led to a significant drop in the amount of mercury and other harmful pollutants being emitted from the coal power plants across the country today. And that is why the Obama administration's so-called mercury rule has been hailed by advocates as such a success. But now, as I said earlier, the rule is under attack as the Trump administration is trying to not only undo this new mercury rule but also to undermine the theory that it is "appropriate and necessary" for the Agency to enact such rules in the first place.

If the EPA was here today, I am sure that they would tell this panel that we have nothing to worry about, that mercury standards will remain in effect regardless of their actions, and the only reason they are taking a look at this rule now is because they are required to do so by the Supreme Court. But, of course, the EPA didn't come today, and so I'll just say what my perspective is. I don't think that would be true.

The Supreme Court never told the Trump administration to revisit this rule. And the Supreme Court never told the EPA to enact a new policy that would ignore billions of dollars in health benefits

going forward. The Trump administration is acting purely on its own initiative. Why? I don't know. What's clear is the Trump administration is doing more than simply revising the mercury rule. It's trying to set the EPA on an entirely new course going forward, one that requires the Agency to ignore the real health benefits that our Nation's environmental policies often provide to the public.

I want to thank our witnesses for coming today. We have experts who will explain how the administration's new mercury proposal contradicts the, quote, "relevant guidance and decades of practice by administrations of both political parties." They'll explain how it ignores the very real benefit that comes from regulating the hazardous pollutants coming from our Nation's power plants and how the Trump administration is conveniently ignoring some key realities and important new information when arguing that the cost of these proposals greatly outweighs the benefits.

For example, according to recent studies, the annual direct benefit of regulating mercury could be in the billions, not the millions as originally estimated. And the total implementation cost for countries to come into compliance was actually much lower than was predicted.

But what's the most puzzling is the timing, because in arguing the cost versus benefit of the mercury rule, the EPA seems to have forgotten the rule has been in place for years already. The industry has already complied. And if you undo the rule now, it would put the public's health at risk and also the companies' ability to recover the money they invested to comply. That's why some of the people who want to keep this rule in place is the power industry itself. So, if undoing the rule would be bad for public health, bad for the environment, and bad for industry itself, who does it help? And why is the EPA pushing this? That's what I'm trying to understand.

Now, I just want to close briefly by saying that I'm continually frustrated and surprised by the administration's refusal to send witnesses to Congress. And the EPA's refusal to show up today is just another example of the efforts to block Congress from performing its oversight functions. And so we are going to have to move forward, but it would be really helpful if we had the agencies here to help us.

[The prepared statement of Ms. DeGette follows:]

PREPARED STATEMENT OF HON. DIANA DEGETTE

Today, we take a look at the Trump administration's ill-conceived and—quite frankly—mindboggling efforts to undermine the U.S. Environmental Protection Agency's (EPA) rule that limits mercury emissions from our Nation's coal power plants.

Mercury is one of the most toxic substances on the planet—and it's one that can cause real harm to the brain, heart and other essential bodily systems.

Despite the dangers that this toxic metal can cause, for years there had been no Federal regulations limiting how much mercury that our coal-fired power plants could emit into the atmosphere each year.

Let me be clear about something: When the EPA fails to enact clean air protections, it is our communities, and our families, and our environment that pay the price. And when an administration—like the one we have today—tries to unravel the protections that we already have, it puts all of us at risk.

In 2012, to better protect the public from the threat posed by mercury emissions, the Obama administration determined that it was "appropriate and necessary" under the Clean Air Act for the EPA to limit how much mercury coal power plants could emit each year.

The Obama administration finalized these new standards in a new rule it enacted that year known as the Mercury and Air Toxics Standards, or “MATS.”

In justifying its decision to enact these new limits, the Obama administration estimated that while it would cost the industry more than \$9 billion to comply with the new rule, the new standards would generate \$4 to \$6 million in direct health benefits, and as much as \$90 billion in additional health benefits every year by reducing people’s exposure to the toxic metal.

While the industry chose to challenge the new standards in court, they were upheld as the EPA, at the time, argued—again and again—that it was “appropriate and necessary” for the Agency to limit mercury pollution from power plants.

With the courts siding with the administration, the industry eventually moved forward and invested billions of dollars in new technology and pollution controls to comply with the new standards.

The investments these companies made have led to a significant drop in the amount of mercury and other harmful pollutants being admitted from coal-powered plants across the country today.

And it’s why the Obama administration’s so-called mercury rule has been hailed as such a success.

But now that rule is under attack, as the Trump administration—which has shown a determination to roll back many of our Nation’s environmental protections—is trying to not only undo the mercury rule, but also undermine the theory that it is “appropriate and necessary” for the Agency to enact such rules in the first place.

If the EPA were here today, I’m sure they would tell this panel that we have nothing to worry about. That the mercury standards will remain in effect regardless of their actions, and the only reason they are taking a look at this rule now is because they are required to do so by the Supreme Court.

But that wouldn’t be entirely true. The Supreme Court never told the Trump administration to revisit this rule. And, the Supreme Court never told the EPA to enact a new policy that would ignore billions of dollars in public health benefits going forward. The Trump administration is acting purely on its own accord, we know that. But what we don’t know is: why?

What is clear is: the Trump administration is doing more than simply revisiting this rule. It’s attempting to set the EPA on an entirely new course going forward—one that requires the Agency to ignore the real health benefits that our Nation’s environmental policies often provide the public.

We have experts here today who will explain how the Trump administration’s new mercury proposal contradicts “the relevant guidance and decades of practice by administration of both political parties.”

They will explain how it ignores the very real benefit that comes from regulating the hazardous pollutants coming from our Nation’s power plants. And how the Trump administration is conveniently ignoring some key realities and important new information when arguing that the cost of these proposals greatly outweighs the benefits.

For example, according to recent studies, the annual direct benefit of regulating mercury could be in the billions—not millions, as originally estimated. And that the total implementation cost for these companies to come into compliance was actually much lower than originally predicted.

But what makes this proposal most puzzling is the timing.

You see, in arguing the cost vs. benefit of the mercury rule, the EPA seems to have forgotten that this is a rule that’s been in place for years now.

The industry has already spent the billions of dollars it took to come into compliance with this rule.

And by undoing this rule now, the administration would actually not only be putting the public’s health at risk but it would also be putting the companies’ ability to recover the money they invested to comply with these new standards at risk, as well.

That’s why, among those who support keeping this important rule in place is the coal power industry itself.

So, if undoing this rule would be bad for public health, bad for the environment, and bad for the industry itself, who does it help? And why is the EPA pushing so hard to get this done?

That’s what we are seeking to understand.

Unfortunately, the EPA is, in effect, pleading the fifth in this case by refusing to send a witness to testify here today.

I wish I could say I was shocked, but this is just the latest in a series of actions that this agency has taken to withhold information from this committee, including information that Administrator Wheeler had personally committed to providing when he was here to testify in April.

If the EPA wants to continue to ignore this committee as we perform our oversight responsibilities, that's its choice. It's not a wise choice, but it is a choice they have seemed to make. It will not deter or slow our efforts to get to the truth. And it won't stop us from doing the work that we have set out to do. It only strengthens our resolve. And we will continue to take whatever actions we believe are necessary to safeguard the health of our environment and the health of the American people. Thank you, and I yield.

Ms. DEGETTE. And, with that, I'm pleased to yield 5 minutes to the ranking member, Mr. Guthrie.

OPENING STATEMENT OF HON. BRETT GUTHRIE, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF KENTUCKY

Mr. GUTHRIE. Thank you, Chair DeGette. And thank you for holding this important hearing.

The Mercury Air Toxic Standards, MATS, was created to regulate mercury levels, and I think it's important to today's conversation to discuss where mercury comes from and how we in the United States are primarily exposed to it.

Mercury can be released through human activity, such as burning materials which contain mercury. It is also released into the atmosphere naturally through events, such as volcanic eruptions, forest fires, and normal breakdown of minerals and rock and soil. Mercury levels in certain areas can vary depending not only on how much mercury is released locally, but what can also come from regional, national, even international sources due to wind and weather patterns.

Once released into the atmosphere, mercury will eventually deposit into bodies of water or onto land, where it will also ultimately be transported into water. In the water, microorganisms can change the mercury into methyl mercury, and the methyl mercury will accumulate up the food chain into fish and shellfish.

While exposure to mercury takes several forms, nearly all human exposure to methyl mercury in the United States occurs through fish and shellfish consumption. The regulation we are discussing today, MATS, was intended to help reduce the amount of mercury created from human activity, specifically mercury emitted from coal- and oil-fired electric utility steam plants generating units, or EGUs.

The creation of MATS dates back to 1990 Clean Air Act amendments where the Environmental Protection Agency was required to conduct studies on coal- and oil-fired EGUs to form the EPA's decision where it was "appropriate and necessary" to regulate EGUs under section 112 of the Clean Air Act. After conducting multiple studies in 2000, the Clinton administration found that it was "appropriate and necessary" to regulate coal- and oil-fired EGUs under the Clean Air Act section 112 and added EGUs to the Act's 112(c) list of source categories that must be regulated.

MATS has had a lengthy and complex history across multiple administrations involving studies, proposed rules, final rules, cases before the DC circuit, and a case before the Supreme Court in 2015 where the Supreme Court told EPA they had to consider costs when determining whether this regulation was "appropriate and necessary," which EPA had not previously done.

Most recently, in December, the EPA issued a proposed rulemaking to the National Emissions Standards for Hazardous Air Pollution, or NESHAP, for EGUs. In the rule, EPA makes four proposals: to determine that it is not “appropriate and necessary” to regulate hazardous air pollutant emissions from coal- and oil-fired EGUs planned under section 112 of the Clean Air Act; to keep coal- and oil-fired EGUs as a source category on the Clean Air Act section 112(c) list of sources that must be regulated under 112(d) of the Act, thereby keeping the emission standards and other requirements of the MATS rule in place for coal- and oil-fired power plants; three, to solicit on whether the Agency has the authority and/or obligation to delist EGUs from section 112(c) of the Act and rescind the NESHAP for coal- and oil-fired EGUs; and, four, to propose the results of the residual risk and technology review of NESHAP for coal- and oil-fired EGUs.

This proposed rule does not remove the standard. It only proposes to remove the “appropriate and necessary” finding that almost entirely justified the cost of MATS regulation by the cobenefits of regulating particulate matter on which, by Congress’ design, is regulated under a different section of the Act. Today’s conversation examines a lot of very complex questions and I believe have potential significance beyond MATS. For example, was the “appropriate and necessary” finding that justified MATS sound? Was the regulation made under the right section of the Act? And how should a regulatory body weigh coal benefits in crafting future regulations, et cetera? All of these questions are important, and I hope we can have a thorough and honest discussion to inform future rulemaking.

I thank our witnesses for being here today. While it is unfortunate the EPA cannot be here today to testify as well, I hope the Chair schedules a second hearing soon so the Agency’s perspective can be heard on these important issues.

Thank you, and I yield back.

[The prepared statement of Mr. Guthrie follows:]

PREPARED STATEMENT OF HON. BRETT GUTHRIE

Thank you, Chair DeGette, for holding this important hearing.

The Mercury and Air Toxics Standards (MATS) was created to regulate mercury levels, and I think it’s important to today’s conversation to discuss where mercury comes from and how we, in the United States, are primarily exposed to it.

Mercury can be released through human activity, such as burning materials which contain mercury. It is also released into the atmosphere naturally, through events such as volcanic eruptions, forest fires, or the normal breakdown of minerals in rocks and soil. Mercury levels in certain areas can vary depending not only on how much mercury is released locally, but can also come from regional, national, and even international sources due to wind and weather patterns.

Once released into the atmosphere, mercury will eventually deposit into bodies of water or onto land—where it also will ultimately be transported into water. In the water, microorganisms can change the mercury into methylmercury, and the methylmercury will accumulate up the food chain into fish and shellfish. While exposure to mercury takes several forms, nearly all human exposure to methylmercury in the United States occurs through fish and shellfish consumption.

The regulation we are discussing here today—MATS—was intended to help reduce the amount of mercury created from human activity, specifically mercury emitted from coal- and oil-fired electric utility steam generating units, or “EGUs.”

The creation of MATS dates back to the 1990 Clean Air Act amendments where the Environmental Protection Agency (EPA) was required to conduct studies on coal- and oil-fired EGUs to inform the EPA’s decision whether it was “appropriate

and necessary” to regulate EGUs under section 112 of the Clean Air Act. After conducting multiple studies, in 2000 the Clinton administration found that it was “appropriate and necessary” to regulate coal- and oil-fired EGUs under the Clean Air Act section 112 and added EGUs to the Act’s 112(c) list of source categories that must be regulated.

MATS has had a lengthy and complex history, across multiple administrations involving studies, proposed rules, final rules, cases before the DC circuit, and a case before the Supreme Court in 2015 where the Supreme Court told EPA they had to consider cost when determining whether this regulation was “appropriate and necessary,” which EPA had not previously done.

Most recently, in December, the EPA issued a proposed rule relating to the National Emission Standards for Hazardous Air Pollutants, or NESHAP, for EGUs. In the rule, EPA makes four proposals:

(1) to determine that it is not “appropriate and necessary” to regulate Hazardous Air Pollutant emissions from coal- and oil-fired EGUs plans under section 112 of the CAA;

(2) to keep coal- and oil-fired EGUs as a source category on the Clean Air Act Section 112(c) list of sources that must be regulated under section 112(d) of the Act, thereby keeping the emission standards and other requirements of the MATS rule in place for coal- and oil-fired power plants;

(3) to solicit comment on whether the Agency has the authority and/or obligation to delist EGUs from section 112(c) of the Act and rescind the NESHAP for coal- and oil-fired EGUs; and

(4) to propose the results of the residual risk and technology review of the NESHAP for coal- and oil-fired EGUs.

Contrary to what my colleagues on the other side of the aisle might think, this proposed rule does not remove the standard, it only proposes to remove the “appropriate and necessary” finding that almost entirely justified the cost of the MATS regulation by the cobenefits of regulating particulate matter, which by Congress’ design, is regulated under a different section of the Act.

Today’s conversation examines a lot of very complex policy questions that I believe have potential significances beyond MATS. For example—was the “appropriate and necessary” finding that justified MATS sound, was this regulation made under the right section of the Act, how should a regulatory body weigh cobenefits in crafting future regulations, etc. All of these questions are important, and I hope that we can have a thorough and honest discussion to inform future rule making.

I thank our witnesses for being here today. While it is unfortunate that EPA could not be here today to testify as well, I hope the Chair schedules a second hearing soon to hear the Agency’s perspective on these important issues.

Ms. DEGETTE. I thank the ranking member.

I’m now pleased to recognize the vice chair of the Oversight Subcommittee, Mr. Kennedy, for 5 minutes for purposes of an opening statement.

OPENING STATEMENT OF HON. JOSEPH P. KENNEDY III, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF MASSACHUSETTS

Mr. KENNEDY. Thank you, Madam Chair.

Over the past 2 1A½ years, the Trump administration has upheld its promise time and again to roll back critical environmental protections. Nearly every day, families and communities are at greater risk of losing access to clean air and clean water at the expense of political convenience.

Since 2012, the EPA has written a success story for public health and the environment through its implementation of mercury and toxic air standards, MATS.

One analysis by the EPA calculated the reduction level from 86 percent of mercury emissions from 2010 to 2017. Yet despite that success, EPA is now proposing to reverse its own findings and perhaps the entire MATS regulatory structure.

Mercury can be highly toxic to infants, children, and adults, including severe consequences to the heart, kidney, and immune system functions. Prenatal exposure can cause severe neurological damage that lasts a lifetime.

Over the years, the EPA has taken steps to limit emissions of mercury from industrial sources like waste incinerators and cement and brick production. In 2012, after extensive consultation with the power sector and other stakeholders, EPA finalized standards under the Clean Air Act to reduce emissions of mercury and other toxic air pollutants from coal-fired power plants.

The final rule was quickly challenged in Federal court by the coal industry, which argued that the EPA made a flawed determination that it was, quote, “appropriate and necessary” to limit mercury emissions from power plants. The case made its way all the way to the Supreme Court, which held that the EPA should have considered costs when making its determination.

In response to the Supreme Court’s ruling in 2016, the EPA issued a supplemental finding which determined that the consideration of costs confirmed its prior determination that the regulation of mercury emissions was still, quote, “appropriate and necessary.”

Throughout these legal challenges, the electric generating industry pursued regulatory compliance, spending billions of dollars on technologies to limit mercury and other toxic emissions, contributing to a nearly 90 percent decrease in mercury emissions in the past decade. According to a July 2018 letter from the electric industry to EPA, all covered power plants had implemented the regulation and were operating pollution controls. Unfortunately, this past December, despite all the success in reductions of mercury emissions, Trump EPA issued its stunning reversal by proposing it is no longer, quote, “appropriate and necessary,” unquote, to limit mercury emissions from power plants under the Clean Air Act. The EPA reached this conclusion by redoing the Agency’s cost-benefit analysis. In this new calculation, the Agency disregarded the health and other benefits of reducing pollutants not directly targeted to MATS, also known as cobenefits.

With those benefits out of the picture, EPA determined the cost of the rule greatly outweighed its benefits. The Trump EPA and its supporters claim that this new approach is reasonable and perhaps even legally required. But the former head of the EPA’s Air and Radiation Office, who helped finalize this rule during the Obama administration, is here today and will say just the opposite. By doing what they are doing, the Trump EPA is, quote, “choosing to paint itself into this corner,” end quote.

The Trump EPA argues that its policy approach is rational because the pollutant reductions it ignores for purposes of the MATS rule are regulated under a different provision under the Clean Air Act. But, as you will hear today from one expert on cost-benefit analysis, the Trump EPA approach is, quote, “irrational,” end quote, and further will result in a, quote, “biased and misleading estimate of costs and benefits.”

Beyond its wrong-headed and unjustified approach to the cost-benefit analysis, the Trump EPA’s proposed determination relies on an out-of-date record from 2011. We now know that the cost of the MATS rule are lower and the direct benefits of mercury and toxic

air reductions are much higher than indicated in the 2011 record. The Trump EPA conveniently disregards this information.

Administrator Wheeler is now working to justify this decision by claiming that the EPA is required to act by the Supreme Court. However, in truth, the EPA, in a prior administration, already responded to the Supreme Court's concerns.

The new proposal is opposed by parents, by doctors, by nurses, by Tribes, by faith leaders, and even by the regulated industry itself. Unfortunately, the EPA declined an invitation to attend this hearing to offer a much-needed explanation of its decision.

For an agency under this administration that has demonstrated time and again that it is not serious about its mission, this dangerous and misleading proposal to undermine mercury and toxic air protections is a new low and unnecessarily creates risks to both public health and the environment.

Thank you, Madam Chair, for holding this important hearing, and I yield back.

[The prepared statement of Mr. Kennedy follows:]

PREPARED STATEMENT OF HON. JOSEPH P. KENNEDY III

Thank you, Madame Chair.

Over the last 2 1A½ years, the Trump administration has upheld its promise time and again to roll back critical environmental protections. Nearly every day, families and communities are at greater risk of losing access to clean air and clean water at the expense of political convenience.

Since 2012, the EPA has written a success story for public health and the environment through its implementation of mercury and toxic air standards (MATS). One analysis by the EPA estimated a reduction level of 86 percent of mercury emissions from 2010 to 2017. Despite the success, the EPA is now proposing to reverse its own findings and perhaps the entire MATS regulatory structure.

Mercury can be highly toxic to infants, children, and adults, including severe consequences to heart, kidney, and immune system functions. Prenatal exposure can cause severe neurological damage that lasts a lifetime.

Over the years, the EPA has taken steps to limit emissions of mercury from industrial sources like waste incinerators and cement and brick production.

In 2012, after extensive consultation with the power sector and other stakeholders, EPA finalized standards under the Clean Air Act to reduce emissions of mercury and other toxic air pollutants from coal-fired power plants.

The final rule was quickly challenged in Federal court by the coal industry, which argued that EPA made a flawed determination that it was "appropriate and necessary" to limit mercury emissions from power plants. The case made its way to the Supreme Court, which held that the EPA should have considered cost when making its determination.

In response to the Supreme Court's ruling, in 2016 the EPA issued a supplemental finding which determined that the consideration of cost confirmed its prior determination that the regulation of mercury emissions was still "appropriate and necessary."

Throughout the legal challenges, the electric generating industry pursued regulatory compliance, spending billions of dollars on technologies to limit mercury and other toxic emissions, contributing to a nearly 90 percent decrease in mercury emissions in the past decade. According to a July 2018 letter from the electric industry to the EPA, all covered plants had implemented the regulation and were operating pollution controls.

Unfortunately, this past December, despite all the successes and reductions of mercury emissions, the Trump EPA issued a stunning reversal by proposing it is no longer "appropriate and necessary" to limit mercury emissions from power plants under the Clean Air Act.

EPA reached this conclusion by redoing the Agency's cost-benefit analysis. In its new calculation, the Agency disregarded the health and other benefits from reducing pollutants not directly targeted by MATS, also known as "cobenefits." With those benefits out of the picture, the EPA determined costs of the rule greatly outweighed its benefits.

The Trump EPA and its supporters claim this new approach is reasonable, and perhaps even legally required. But the former head of EPA's air and radiation office, who helped finalize this rule during the Obama administration, is here today and will say just the opposite: By doing what they are doing, the Trump EPA is "choosing to paint itself into this corner."

The Trump EPA argues that its policy approach is rational because the pollutant reductions it ignores for purposes of the MATS rule are regulated under a different provision of the Clean Air Act. But as you will hear today from one expert on cost-benefit analysis, the Trump EPA approach is [quote] "irrational," and further, will result in a "biased and misleading estimate of costs and benefits."

Beyond its wrong-headed and unjustified approach to the cost-benefit analysis, the Trump EPA's proposed determination relies on an out-of-date record from 2011. We now know that the costs of the MATS rule are lower, and the direct benefits from mercury and air toxic reductions are much higher than indicated in the 2011 record.

The Trump EPA conveniently disregards this information.

Administrator Wheeler is now working to justify this decision by claiming the EPA is required to act by the Supreme Court. However, in truth, the EPA in the prior administration already responded to the Supreme Court's concerns.

The new proposal is opposed by parents, doctors, nurses, tribes, faith leaders, and even the regulated industry itself.

Unfortunately, the EPA declined an invitation to attend this hearing to offer much need explanation on its decision.

For an agency under this administration that has demonstrated time and time again that it's not serious about its mission, this dangerous and misleading proposal to undermine mercury and air toxics protections is a new low and unnecessarily creates new risks to both public health and the environment.

Thank you, I yield.

Ms. DEGETTE. I thank the gentleman.

The Chair now recognizes the ranking member of the full committee, Mr. Walden, for 5 minutes for the purposes of an opening statement.

OPENING STATEMENT OF HON. GREG WALDEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

Mr. WALDEN. Good morning, Madam Chair, and thanks for holding this important hearing.

Mercury poisoning poses a serious risk to all children and to all adults, especially pregnant women and infants. The mercury levels in certain areas depend on how much mercury is not only released locally but also how much is released across the globe. The amount of mercury that travels across the globe is not insignificant. Some research suggests that about one-fifth of the mercury that enters the Willamette River in Oregon comes from abroad, and oftentimes from China.

So let's be clear, though. In the recent proposal, the EPA is not changing the emission standards and other requirements of the MATS rule for coal- and oil-fired power plants. Indeed, the EPA explicitly says that their proposal is to keep power plants on the Clean Air Act section 112(c) source list and not to change the existing emission standards promulgated in 2012. The decision to keep the existing emission standards in place for power plants makes sense, especially given that the industry has already complied with the MATS rule. The initial compliance date was over 4 years ago.

Power plants reduced mercury emissions by about 86 percent and reduced emissions of total hazardous air pollutants by 96 percent since 2010. These reductions have come at a large cost to the industry and to consumers.

In their comments to the proposed rule, the U.S. Chamber of Commerce said the power sector spent about \$18 billion on compliance controls thus far.

So not only is it logical for the EPA to keep the existing emission standards in place for power plants, but also, under a 2008 DC circuit court case, the EPA cannot change the existing emission standards unless they go through the extremely rigorous delisting process under section 112(c)(9) of Clean Air Act.

Given this precedent and how difficult it is to delist a source category from the section 112(c)(1) list of the Clean Air Act, I have questions for the witnesses today about the likelihood of this risk, especially since industry is already in compliance with the standards.

Now, when the Obama administration first promulgated the MATS rule, they did not consider the cost to regulation, as you've already heard. The Supreme Court in *Michigan v. EPA* clearly said that was wrong, stating that the EPA must consider cost when determining whether it was "appropriate and necessary" to regulate power plants for HAPS.

In response, the Obama administration issued a 2016 supplemental finding putting forth two cost approaches, a cost reasonableness test and a cost-benefit analysis to determine it was "appropriate and necessary" to move forward.

The EPA heavily relied on the cobenefit of reductions in particulate matter 2.5 in its cost-benefit analysis, with more than 99 percent of the benefits being cobenefits. The Obama administration's interpretation of how to consider cost is open to argument.

Immediately after the 2016 supplemental finding was issued, it was challenged in court. This litigation is ongoing, and the DC circuit is currently holding the case in abeyance.

The Trump administration's proposed rule revises the EPA's approach to the decision in *Michigan v. EPA* and, in the EPA's own words, and I quote, "corrects flaws in the EPA's prior 2016 response to *Michigan*," close quote.

The EPA calls into question the previous administration's heavy reliance on cobenefits to justify its "appropriate and necessary" finding.

As Chief Justice John Roberts highlighted through his questioning during oral argument in *Michigan*, it is questionable whether a pollutant that already has its own regulatory framework under the Clean Air Act, such as PM2.5, should be so heavily relied on as a cobenefit to justify a regulation of another type of pollutant. The EPA proposes instead to directly compare the cost of compliance with MATS with the benefits specifically associated with reducing emissions of HAP.

The Clean Air Act is silent on whether or not the EPA should consider cobenefits in the rulemaking process. I remind my colleague, this body has the ability to change the law and statutorily determine whether and how cobenefits should be considered. But I've seen no bills introduced to do that to date.

If Congress remains silent, as we have since 1990, then I strongly suspect that this issue ultimately will be determined by the Supreme Court.

I want to thank our witnesses for being here today. It's my understanding that the majority did invite the EPA to testify today. And, unfortunately, the EPA declined that invitation, explaining they had a conflict and offered to come at a later date. I'm disappointed the EPA is not here today. They should be to explain the proposal and the reasons they have issued this proposed rule. So I hope we have a second hearing where they can attend.

I would point out there have been other hearings where the majority has not invited the administration to present testimony, made a decision to do that when we've asked them to. So it kind of goes both ways. But in this case, the EPA ought to be here. I'm with you, Madam Chair, and we'll work with you to make sure they show up next time.

And, with that, I yield back.

[The prepared statement of Mr. Walden follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

Thank you, Chair DeGette, for holding this important hearing.

Mercury poisoning poses a serious risk to all children and adults—especially pregnant women and infants. The mercury levels in certain areas depend on how much mercury is not only released locally, but also how much is released across the globe. The amount of mercury that travels across the globe is not insignificant—some research suggests that about one-fifth of the mercury entering the Willamette River in Oregon comes from abroad—oftentimes from China.

Let's be clear though—in their recent proposal, the EPA is not changing the emission standards and other requirements of the MATS rule for coal- and oil-fired power plants. Indeed, the EPA explicitly says that their proposal is to keep power plants on the Clean Air Act section 112(c) source list and not to change the existing emissions standards promulgated in 2012.

The decision to keep the existing emission standards in place for power plants makes sense, especially given that industry has already complied with the MATS rule. The initial compliance date was over 4 years ago. Power plants have reduced mercury emissions by about 86 percent and reduced emissions of total Hazardous Air Pollutants (HAPs) by 96 percent since 2010. These reductions have come at a large cost to industry, however. In their comments to the proposed rule, the U.S. Chamber of Commerce said the power sector has spent about \$18 billion on compliance controls thus far.

Not only is it logical for the EPA to keep the existing emission standards in place for power plants, but also, under a 2008 DC Circuit case, the EPA cannot change the existing emission standards unless they go through the extremely rigorous delisting process under section 112(c)(9) of the Clean Air Act. Given this precedent and how difficult it is to delist a source category from the section 112(c)(1) list of the Clean Air Act, I have questions for the witnesses today about the likelihood of this risk, especially since industry is already in compliance with the standards.

When the Obama administration first promulgated the MATS rule, they did not consider the cost of the regulation. The Supreme Court, in *Michigan v. EPA*, clearly said that was wrong, stating that the EPA must consider cost when determining whether it was “appropriate and necessary” to regulate power plants for HAPs. In response, the Obama administration issued a 2016 Supplemental Finding putting forth two cost approaches—a cost reasonableness test and a cost-benefit analysis—to determine it was “appropriate and necessary” to move forward. The EPA heavily relied on the cobenefit of reductions in particulate matter 2.5 in its cost benefit analysis, with more than 99 percent of the benefits being cobenefits.

The Obama administration's interpretation of how to consider costs is open to argument. Immediately after the 2016 Supplemental Finding was issued, it was challenged in court. This litigation is ongoing, and the DC Circuit is currently holding the case in abeyance.

The Trump administration's proposed rule revises the EPA's approach to the decision in *Michigan v. EPA*, and in the EPA's own words “corrects flaws in the EPA's prior 2016 response to *Michigan*.” The EPA calls into question the previous administration's heavy reliance on cobenefits to justify its “appropriate and necessary” finding. As Chief Justice John Roberts highlighted through his questioning during oral argument in *Michigan*, it is questionable whether a pollutant that already has its

own regulatory framework under the CAA—such as PM 2.5—should be so heavily relied on as a cobenefit to justify a regulation for another type of pollutant. The EPA proposes instead to directly compare the cost of compliance with MATS with the benefits specifically associated with reducing emissions of HAP.

The Clean Air Act is silent on whether, or how, the EPA should consider cobenefits in the rulemaking process. I remind my colleagues that this body has the ability to change the law and statutorily determine whether and how cobenefits should be considered. I've seen no bills introduced to date on this point. If Congress remains silent—as we have since 1990—then I strongly suspect that this issue will ultimately be determined by the Supreme Court.

I want to thank the witnesses for being here today. It is my understanding that the majority invited the EPA to testify today and the EPA declined the invitation, explaining that they had a conflict and offering to come at a later date. I'm disappointed that the EPA is not here today to explain the proposal and the reasons they have issued this proposed rule. I hope the Chair schedules a second hearing with the EPA soon.

Ms. DEGETTE. The gentleman yields back.

I now ask unanimous consent that the Members' written opening statements be made part of the record.

Without objection, so ordered.

I now want to introduce the panel of witnesses for today's hearing: Ms. Janet McCabe, who is the former Acting Administrator, the Office of Air and Radiation, U.S. EPA; Ms. Heather McTeer Toney, who is the national field director for Moms Clean Air Force; Mr. Michael Livermore, associate professor of law at the University of Virginia; Dr. Noelle Eckley Selin, Ph.D., associate professor at MIT, director of the MIT Technology and Policy Program; Dr. Philip Landrigan, M.D., M.Sc., director of Global Public Health Program and Global Pollution Observatory at the Schiller Institute for Integrated Science and Society, Boston College; and Mr. Adam R.F. Gustafson, partner of Boyden Gray & Associates PLLC.

Thank you all for appearing before the subcommittee today. And I know you're aware that the committee is holding an investigative hearing. And when we do so, we take testimony under oath.

Does anyone have an objection to testifying today under oath?

Seeing no objections, let the record reflect the witnesses have responded no.

The Chair then advises you, under the rules of the House and the rules of the committee, you're entitled to be accompanied by counsel.

Do any of you wish to be accompanied by counsel today?

Let the record reflect the witnesses responded no.

So, please, if you would, please, rise and raise your right hand so you may be sworn in.

[Witnesses sworn.]

Ms. DEGETTE. Let the record reflect the witnesses have responded affirmatively, and they've been seated.

You are now under oath and subject to the penalties set forth in title 18, section 1001, of the United States Code.

Now the Chair will recognize witnesses for 5-minute opening statements. In front of you, you've got a microphone and a series of lights. The light turns yellow when you have a minute left and red to indicate your time has come to an end.

And so, Ms. McCabe, you're first. And I'm pleased to recognize you now for 5 minutes.

STATEMENTS OF JANET McCABE, FORMER ACTING ASSISTANT ADMINISTRATOR, OFFICE OF AIR AND RADIATION, ENVIRONMENTAL PROTECTION AGENCY; HEATHER McTEER TONEY, NATIONAL FIELD DIRECTOR, MOMS CLEAN AIR FORCE; MICHAEL A. LIVERMORE, ASSOCIATE PROFESSOR OF LAW, UNIVERSITY OF VIRGINIA; NOELLE ECKLEY SELIN, PH.D., ASSOCIATE PROFESSOR AND DIRECTOR, TECHNOLOGY AND POLICY PROGRAM, MASSACHUSETTS INSTITUTE OF TECHNOLOGY; PHILIP J. LANDRIGAN, M.D., DIRECTOR, GLOBAL PUBLIC HEALTH PROGRAM, SCHILLER INSTITUTE FOR INTEGRATED SCIENCE AND SOCIETY, BOSTON COLLEGE; AND ADAM R. F. GUSTAFSON, PARTNER, BOYDEN GRAY & ASSOCIATES PLLC

STATEMENT OF JANET McCABE

Ms. McCABE. Thank you, Chair DeGette, and members of the subcommittee. I appreciate being here today and note that I'm here in my personal capacity, not representing Indiana University.

EPA's proposal to withdraw the "appropriate and necessary" finding that underpins the MATS rule is of grave concern for three reasons. First, it provides the legal predicate for the eventual withdrawal of a rule that protects the most vulnerable among us from exposure to mercury and other harmful pollutants. It takes a radical new approach to consideration of health benefits that has implications far beyond this rule. And it injects regulatory uncertainty into a program the industry has already complied with and does not want to be reopened.

Mercury is extremely harmful to human health, especially babies and pregnant women and their unborn children. Prior to MATS, fossil-fired power plants were the single largest industrial emitter of mercury.

In 1990, Congress adopted a technology-based approach to addressing emissions of air toxic from stationary sources. Because coal-fired power plants were already regulated through other programs, such as the acid rain program, Congress required EPA to evaluate whether it was "appropriate and necessary" to develop a rule for them.

The EPA made that finding in 2000 but in 2005 reversed it, instead issuing a national mercury cap-and-trade program. The DC circuit overturned that rule, leaving the Obama administration to address this ongoing regulatory obligation.

EPA issued MATS and a new finding in 2011. EPA used the best information available and followed longstanding OMB guidance to project the cost and benefits of the rule. That meant considering the full range of health benefits, including reductions of all harmful air pollutants, monetized or not.

As is often the case, the technologies EPA expected utilities would use to control mercury would also reduce other harmful air pollutants, such as fine particles. The health effects of these pollutants are significant, and these reductions were not already required by other programs.

The DC circuit fully upheld MATS. The Supreme Court agreed, except that it held that EPA should have considered cost as part of the "appropriate and necessary" finding itself. So the EPA issued

a supplemental finding in 2016 looking at cost and benefits in several ways and again concluding that MATS was "appropriate and necessary."

In the meantime, the industry implemented the rule and is now in compliance. Although EEI and others urged EPA not to change the "appropriate and necessary" finding or the provisions of MATS, EPA issued its proposed withdrawal earlier this year.

EPA now proposes to conclude that the costs outweigh the benefits, looking at the very same information it considered in 2011 and 2015 but using a radically different approach to how it considers benefits. And while EPA presents this almost as if it has no choice, the Agency is choosing to paint itself into this corner.

First, despite saying that it is not proposing to rescind MATS, a rescission of the finding would create the legal predicate for the Agency to do so or for outside parties to petition EPA to do so and sue them if they don't. EPA indeed seeks comment on this very question, and we're seeing public statements that indicate people believe that this is the first step to repeal of MATS.

Second, EPA proposes to reverse itself on the strength of a single highly significant policy change, that it's inappropriate to consider fully the health and benefits associated with any pollution reductions other than the air toxic specifically targeted by the rule. This approach ignores decades-old OMB guidance and years of agency practice that value both direct and indirect benefits. It also ignores cause-and-effect realities and favors industry costs over public health benefits.

The EPA's approach distorts cost-benefit analysis in ways that reasonable businesses would not do. Savvy businesses try to achieve multiple benefits when installing new equipment. One pollution control technology often accomplishes multiple purposes and helps with compliance beyond the specific rule that drives the initial investment.

EPA is basing this revised analysis on a record that is demonstrably out of date. There's now information showing both that costs have been lower and benefits will be higher. If EPA is going to proactively reopen this rule and dramatically change its methodology, to willfully ignore the facts on the ground turns this into an academic exercise. Rulemaking under the Clean Air Act is not academic. These programs affect health and quality of life for millions of people.

The proposal also unnecessarily creates uncertainty for utilities who have already complied. If EPA reverses the finding, it will kick the legal legs out from under the standards themselves. And if the requirements go away, it may complicate rate recovery, or utilities may decide to operate their controls less, which would mean a return to higher mercury and other toxics in our communities.

If EPA finalizes this rule, we can reasonably expect to see this approach to devaluing health benefits in every EPA proposal.

This program has been a success. Mercury emissions from coal plants have gone down, and mercury levels in water and fish have decreased. This program is in the rearview mirror for utilities, and contrary to EPA's mission to protect public health and the environment, it should not be finalized.

And I apologize for going over.

Thank you.

[The prepared statement of Ms. McCabe follows:]

Written Testimony

Janet McCabe

Professor Indiana University McKinney School of Law and Senior Law Fellow at the
Environmental Law and Policy Center
Before the Oversight and Investigations Subcommittee of the U.S. House Committee on Energy
and Commerce

May 21, 2019

Thank you, Madam Chair and Members of the Subcommittee, for the opportunity to testify today. My name is Janet McCabe and I am a Professor at the Indiana University McKinney School of Law and Senior Law Fellow at the Environmental Law and Policy Center. I spent nearly eight years in the U. S. Environmental Protection Agency's (EPA) Office of Air and Radiation, first as the Principal Deputy Assistant Administrator and then as the Acting Assistant Administrator. Before that, I spent two decades working in state government on air quality and other environmental issues, at the Indiana Department of Environmental Management and before that at several agencies in Massachusetts. While at EPA I worked on a wide range of Clean Air Act programs and, in particular, on the development of the Mercury and Air Toxics Standards, the subject of this hearing. I am grateful to be able to present testimony here today, as MATS is one of the great success stories of air pollution reduction and public health protection, and EPA's recent proposal is of significant concern for a number of reasons. I am here today representing myself, and not on behalf of Indiana University.

The dangers of mercury to human health and where it comes from

Mercury is one of the most toxic substances on earth. When inhaled or ingested by humans, mercury can cause severe neurological damage, cardiovascular harm, endocrine disruption, kidney damage and muscle coordination issues.ⁱ When pregnant women are exposed, their babies can suffer IQ and motor skills impairments that will last their lifetime.ⁱⁱ Through rain, snow, or dry deposition, mercury can deposit either directly into waterbodies or indirectly into waterbodies via groundwater seepage through plants and soil.ⁱⁱⁱ Mercury is emitted by sources around the world; some of it travels long distances around the globe, while

other sources deposit relatively close to where it has been emitted. Once in water, mercury chemically transforms into methylmercury, which is readily taken up first by plant and then by animal life and moves up the food chain to ultimately be consumed by people. People are primarily exposed to mercury through the consumption of freshwater or marine fish, either self-caught or, more commonly, purchased at the grocery store or a restaurant.

There have been mercury poisoning events of devastating proportion, including in Minamata, Japan where in 1956 a chemical plant released massive amounts of wastes containing mercury into Minamata Bay, ultimately killing 900 people and injuring more than two thousand.^{iv} Later, in 1971, seed grain treated with a methylmercury fungicide was mistakenly consumed by people in rural Iraq.^v Hundreds, perhaps thousands, of people died or were seriously sickened as a result. These were extreme events, but they highlight the point that a very small amount of mercury can cause significant contamination. According to the Minnesota Pollution Control Agency, “approximately one gram of mercury enters a 20-acre lake each year. Over time, just this small amount can contaminate the fish in that lake, making them unfit to eat on a regular basis.”^{vi}

Anthropogenic sources of mercury include fossil-fuel burning, gold mining, municipal and medical waste incinerators, and cement and brick production. Until three years ago, when the EPA’s Mercury and Air Toxics Standards (MATS) for power plants went into full compliance, the burning of coal and oil in power plants had been the most significant source of industrial mercury emissions in the United States because other US industrial sectors had already been subject to Clean Air Act rules that limited their emissions.^{vii} MATS put in place similar reduction requirements for power plants. In December 2018, however, the EPA issued a proposal that could prove to be a first step in unraveling MATS.^{viii}

How CAA Section 112 works generally and for Power Plants specifically

MATS has deep regulatory roots, and the final rule signed in 2011 was the result of many years of effort. In 1970, Congress passed the Clean Air Act,^{ix} the aim of which was to protect Americans’ health and our environment from the adverse impacts of air pollution. Congress directed the EPA to identify pollutants that posed the most risk and to develop

regulations to reduce that risk. The original risk- and exposure-based approach proved extremely difficult for the EPA to implement. In 1990, Congress changed the approach to one that required the EPA to set technology-based standards for the most significant sources of 189 air toxics Congress listed in the Clean Air Act, based on what the best performers in each sector were achieving.^x With tight technology-based standards for sources and follow-up risk and technology reviews, the program would assure continued reductions of air toxics emissions. Because coal-fired power plants were already regulated through other Clean Air Act programs, such as the Acid Rain program, Congress required several additional studies related to mercury in Section 112(n). In particular, Congress gave the EPA the extra step of evaluating whether existing programs were sufficient to reduce mercury emissions or whether, in the parlance of the Act, it was still “appropriate and necessary” to develop an air toxics rule for these sources.

The Road to MATS

The path of mercury regulation at the EPA was a long and winding one. After making a positive Appropriate and Necessary (A&N) Finding in 2000, the EPA reversed that Finding in 2005, took coal-fired power plants off the list of sources to be regulated for mercury, and issued the Clean Air Mercury Rule^{xi} (CAMR), which switched to a national mercury cap and trade program. In 2008, the DC Circuit Court of Appeals overturned CAMR,^{xii} so when the Obama Administration arrived in 2009, moving this issue forward was one of EPA Administrator Jackson’s highest priorities. Without CAMR, and with the other industries that emitted significant amounts of mercury already subject to regulation, coal-fired power plants were the cheese standing alone, responsible for nearly half of US mercury emissions.

In 2011, Administrator Jackson signed the Mercury and Air Toxics Standards.^{xiii} The rule itself was accompanied by a new A&N Finding and an analysis of the costs and benefits of the rule. The agency worked extensively with the power sector, other federal agencies such as the Department of Energy and the Federal Energy Regulatory Commission, and every other conceivable stakeholder or affected group or entity to develop the rule. The agency received more than 900,000 public comments on the proposal. These comments enabled EPA to improve the analysis and the cost and benefits projections, and allowed the agency to make

changes to the proposal that were legitimately desired by industry and did not compromise public health protection or adherence to the legal requirements of Section 112. For example, the final rule provided a longer averaging time for determining compliance; it provided more flexible monitoring and reporting provisions (which saves sources money); it changed emissions limits and indicators as warranted to make them more in-line with what the real world data supported; and it assured the maximum time would be available for sources to comply. The rule reduces emissions of mercury and of other toxic air pollutants such as arsenic, chromium, nickel, and acid gases.

Using the best information available at that time, the EPA projected that the rule would cost industry \$9.8 billion annually, and generate \$37-90 billion in benefits through improved public health.^{xiv} These are big numbers, but the control technologies the EPA expected utilities would use to control mercury —particularly scrubbers^{xv} — would also reduce other harmful air pollutants, including fine particles, sulfur dioxide and nitrogen oxides. The health effects of these pollutants are well-studied and costly; reducing these pollutants has been demonstrated to save lives. I will address the issue of “co-benefits” later in this testimony.

As with all modern EPA rules, the next stop was the courthouse. In the first level of review, the DC Circuit Court of Appeals fully upheld MATS.^{xvi} The US Supreme Court agreed, with one exception: it held that the EPA should have considered cost as part of the A&N Finding, and it directed the EPA to do so, leaving the rule in place in the meantime. The Court stated that the law did not require the EPA to conduct a “formal cost-benefit analysis in which each advantage and disadvantage is assigned a monetary value. It will be up to the Agency to decide (as always, within the limits of reasonable interpretation) how to account for cost.”^{xvii} The EPA moved forward to propose and finalize a Supplemental A&N Finding,^{xviii} again concluding that MATS was appropriate and necessary, using several approaches to evaluate the costs and the impact those costs would have on the utility industry and consumers.

MATS has been a regulatory and public health success

In the meantime, the industry went about the business of complying with the rule.

Plants had three, four, or in a very few cases five, years to come into compliance. In a letter to the EPA on July 10, 2018, the Edison Electric Institute, the American Public Power Association, the National Rural Electric Cooperative Association, the International Brotherhood of Electrical Workers and several other organizations, advised^{xix} that “all covered plants have implemented the regulation and that pollution controls—where needed—are installed and operating.” This fact in itself is remarkable. Compliance with environmental rules varies widely across industries and requirements, but timely 100% compliance is rare.

Reconsidering the EPA’s appropriate and necessary finding for MATS was high on the incoming Trump Administration’s to do list. Stakeholders were anticipating a proposal long before it arrived on December 28, 2018, and groups made their views known through meetings with Administration officials, letters, and other forms of advocacy. Most of the comments urged EPA not to change the appropriate and necessary finding or the provisions of MATS. Indeed, notably, the electric utility industry itself reported to the EPA that it had spent \$18 billion *in total* to comply with MATS and that facilities were in compliance, and asked that the EPA “allow the industry to continue full implementation of MATS.”

EPA Chooses to Paint Itself Into a Corner

So, what has the EPA proposed? And, if utilities are already in compliance, why does it matter? The proposal takes the A&N Finding head-on and, despite EPA’s public statements that it is not rescinding the standards themselves, is clearly the first step to doing so and will set the stage for arguments – either by EPA or other parties – that rescission of the emissions standards themselves is legally required.

What does the proposal do? In the proposal,^{xx} the EPA has looked yet again at the information it considered in 2011 and then again in 2015, and now proposes to come out the other way. This is because, EPA now asserts, the costs outweigh the benefits. The proposal does not propose to rescind the standards themselves, though it invites comment on that option.^{xxi} It argues that EPA’s Supplemental Finding in 2016 incorrectly relied on the full range of public health benefits expected from implementation of MATS, including what are called “co-benefits,” and did not adequately consider the costs in relation to the benefits.

The proposal is based on one thing and one thing only. EPA is not looking at any different or updated information. It is not reconsidering the reasonableness of the standards, or the recent history of compliance and costs incurred by the industry. Rather, EPA is going back in time and deciding to take a radically different approach to how it considered costs and benefits in the rule. This approach drastically discounts the public health benefits side of the balance sheet, departing from years of practice and from current OMB guidance. EPA presents this almost as if it has no choice. To the contrary, as I will discuss in more detail below, the agency is choosing to paint itself into this corner. And their choice has implications not just for this rule but for every rule it promulgates going forward. This is a result EPA leadership has made clear it desires. Let me explain these points a little more.

First, despite EPA's protestations that it is not proposing to rescind MATS, a rescission of the A&N Finding, if finalized, will absolutely create the legal predicate for the agency to do so and/or for outside parties to petition EPA to do so and sue them if they do not. Indeed, EPA seeks comment on several possible interpretations that would give it the discretion, or even the obligation, to rescind the MATS standards themselves.^{xxii} At least some in the industry believe that this is the first step in repeal of MATS. For example, in a comment filed with the Indiana Utility Regulatory Commission on February 28, 2019, Peabody COALSLES, LLC argued that Northern Indiana Public Service Company (NIPSCO) was overestimating the future costs of compliance with MATS:

Although NIPSCO understandably installed MATS compliance equipment initially, it is inappropriate for NIPSCO to continue assuming they will incur long-term MATS O&M [operating and maintenance] costs for these electric power generating units. There is a significant likelihood that EPA will withdraw MATS entirely or drastically alter the rule as to reduce the ongoing O&M cost burden....The EPA's current proposal regarding the MATS rule could be subject to legal challenge and force it to go through the de-listing process in § 112(c)(9). Some parties may argue that § 112 requires an "appropriate and necessary" finding before EGUs can be regulated. As a result, withdrawing the "appropriate and necessary" finding but leaving the MATS requirements in place could be found to violate the plain language of the statute, and the EPA may therefore lack the authority or the discretion to proceed with the rule as proposed.^{xxiii}

Second, the EPA proposes to reverse itself on the strength of a single highly significant policy change: the agency now proposes to find that it is inappropriate to consider equally the

health and other benefits associated with any pollution reductions other than mercury and the other air toxics specifically targeted by MATS. This is really the crux of the proposal. Once EPA has separated and discounted those non-Hazardous Air Pollutant (HAP) benefits, the comparison of HAP-only benefits compares less favorably to the costs of the rule, as they were estimated in the 2011 Regulatory Impact Assessment.

There are several significant problems with this approach. It ignores Guidance from the Office of Management and Budget that agencies are to consider both direct and indirect benefits of rules,^{xxiv} and years of agency practice that valued the full extent of public health benefits in EPA rulemaking. It also ignores cause-and-effect realities. It also favors costs over benefits, as the agency makes no effort to exclude indirect costs from the calculation. If you quit smoking to reduce your chances of getting lung cancer, you will also necessarily reduce your risk (and the risk of others around you) of other significant health impacts. Is it really good policy to discount or even ignore those kinds of facts when considering how the costs of quitting smoking measure up to the benefits?

This approach also distorts cost-benefit analysis in ways that reasonable businesses would not do. Savvy businesses try to achieve multiple benefits when installing new equipment or implementing programs. A non-environmental example would be company wellness programs, which improve employees' health while also holding down insurance costs. The utility industry is expert at this: one pollution control technology often accomplishes multiple purposes and helps with their compliance beyond the specific rule that drives the initial investment. Utilities strategically analyze a cost-effective combination of scrubbers, catalytic controls and other approaches to maximize efficiency in reducing sulfur dioxide, nitrogen oxides, mercury, particulates and other pollutants from coal plants. Achieving multiple benefits is sound business practice and common sense.

Another significant flaw in EPA's approach is the fact that it is basing its revised analysis on a record that is demonstrably out of date. On both the costs and the benefits sides of the ledger, there is updated information showing that the costs have been lower than EPA predicted and the benefits will be higher. If EPA is going to proactively take such a substantial tack on its methodological approach on a rule that is so significant to this country, to willfully

ignore the facts on the ground turns this into an academic exercise. Rulemaking under the Clean Air Act is not academic. Rules under the Clean Air Act affect disease, illness, and injury for people all across this country.

Are there other concerns with the proposal? Indeed there are. With this proposal, the EPA has injected uncertainty into a regulatory landscape where certainty is prized by regulated industry. In this case, the regulated industry has already complied and is seeking to recover its costs through rate cases or has already done so. If the EPA reverses the A&N Finding, it will kick the legal legs out from under the standards themselves, leaving them vulnerable to an administrative petition or lawsuit by a third-party seeking rescission or vacatur of the entire rule. If the requirements go away, utilities may not be able to recover the costs they have already expended, or, even if that happens, they may decide to operate their controls less, if at all, to save operating costs.

If EPA finalizes this rule on this basis, it will be a highly significant policy step with ramifications far beyond the MATS rule. If EPA finalizes a rule that minimizes or eliminates altogether consideration of co-benefits on the health benefits side of the balance sheet, we can reasonably expect to see this approach in every EPA rule going forward. Why would we not? There is nothing in EPA's reasoning that would limit this to MATS. Indeed, on June 13, 2018, EPA issued an Advance Notice of Proposed Rulemaking that addressed this same issue.^{xxv} This proposal takes a huge step towards valuing costs to industry far more than improvements to public health.

Let me conclude by observing that mercury emissions from US coal plants have gone down 85% between 2006 and 2016, and mercury levels in water and fish have also decreased.^{xxvi} These reductions are hugely important, particularly in my region of the country, where the Great Lakes provide drinking water, jobs, food, and recreation to millions. That sounds like a successful program to me. This is in the rearview mirror for the utilities. It is a public health success. This proposal would be contrary to EPA's mission, which is to protect public health and the environment, and it should not be finalized.

Thank you very much for the opportunity to provide this input and I look forward to your questions.

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- ⁱ <https://www.atsdr.cdc.gov/PHS/PHS.asp?id=112&tid=24#bookmark05>
- ⁱⁱ <http://environment.harvard.edu/news/general/mercury-matters-2018-science-brief-journalists-and-policy-makers>
- ⁱⁱⁱ <https://www.sciencedaily.com/releases/2007/03/070321181643.htm>
- ^{iv} https://www.theregister.co.uk/2006/07/14/the_odd_body_minimata_disaster/
- ^v <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2366450/>
- ^{vi} <https://www.pca.state.mn.us/quick-links/preventing-mercury-pollution>
- ^{vii} <https://www.epa.gov/international-cooperation/mercury-emissions-global-context>
- ^{viii} <https://www.jurist.org/news/2018/12/epa-announces-plan-to-ease-restrictions-on-power-plants/>
- ^{ix} <https://www.law.cornell.edu/uscode/text/42/7401>
- ^x <https://www.law.cornell.edu/uscode/text/42/7412>
- ^{xi} <https://www.federalregister.gov/documents/2005/05/18/05-8447/standards-of-performance-for-new-and-existing-stationary-sources-electric-utility-steam-generating>
- ^{xii} https://scholar.google.com/scholar_case?case=1980585614175257397&hl=en&as_sdt=6&as_vis=1&oi=scholar
- ^{xiii} <https://www.govinfo.gov/content/pkg/FR-2012-02-16/pdf/2012-806.pdf>
- ^{xiv} <https://www.epa.gov/sites/production/files/2015-11/documents/20111221matsimpactsfs.pdf>
- ^{xv} <https://www.eia.gov/todayinenergy/detail.php?id=4410>
- ^{xvi} https://scholar.google.com/scholar_case?case=12809509887889779783&hl=en&as_sdt=6&as_vis=1&oi=scholar
- ^{xvii} <https://supreme.justia.com/cases/federal/us/576/14-46/>
- ^{xviii} <https://www.federalregister.gov/documents/2016/04/25/2016-09429/supplemental-finding-that-it-is-appropriate-and-necessary-to-regulate-hazardous-air-pollutants-from>
- ^{xix} <http://src.bna.com/Ajk>
- ^{xx} <https://www.epa.gov/mats/proposed-revised-supplemental-finding-and-results-residual-risk-and-technology-review>
- ^{xxi} The proposal also takes on the Residual Risk and Technology review required under §112(f)(2), proposing to find that “residual risks due to emissions of air toxics from this source category are acceptable and that the current standards provide an ample margin of safety to protect public health” and that “[n]o new developments in... emissions reductions were identified under the technology review,” thus concluding that no revisions to MATS are warranted. Many of the public comments address this aspect of the proposal, but I am not addressing that in this testimony.
- ^{xxii} 84 Fed. Reg. 2679, February 7, 2019.
- ^{xxiii} [https://www.in.gov/iurc/files/Peabody%20Public%20IRP%20Comments%20\(4850-6099-4953\).pdf](https://www.in.gov/iurc/files/Peabody%20Public%20IRP%20Comments%20(4850-6099-4953).pdf), p. 11.
- ^{xxiv} <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf>
- ^{xxv} 83 Fed. Reg. 27542.
- ^{xxvi} <http://environment.harvard.edu/news/general/mercury-matters-2018-science-brief-journalists-and-policy-makers>

Ms. DEGETTE. Thank you so much.
The Chair now recognizes Ms. McTeer Toney for 5 minutes.

STATEMENT OF HEATHER McTEER TONEY

Ms. McTEER TONEY. Chairwoman DeGette, Ranking Member Guthrie, and members of the subcommittee, thank you for the opportunity to testify about the U.S. Environmental Protection Agency's mercury and air toxic standards.

My name is Heather McTeer Toney. I serve as the national field director of Moms Clean Air Force. We're a community of over 1 million moms and dads united against air pollution and climate change for the sake of our children's health.

I'm here today to explain why the EPA's proposed rule is completely unacceptable and should be withdrawn. In March of this year, one of our member moms, Nikki Katrice White, traveled with us to DC to participate in an EPA hearing on the MATS proposal.

Nikki is a healthcare worker, a native of Camden, South Carolina, where she lives and raises her two children. And as a Black mother living in the shadow of the local coal-fired power plant, Nikki is acutely aware of the need for strong air pollution controls. She sat before the EPA hearing panel and shared how her family was grateful for the sustainable income yet, at the same time, blissfully unsuspecting of the dangers that come with living alongside coal-fired power plants.

She shared how they didn't think twice when her mother gave birth to her only son, and he was stillborn. They didn't give it a second thought when her mother and sister developed fibroids, because everybody believes that they're common among African-American women. And it didn't even dawn on her when her own children started to have respiratory issues when there was no family history or significant risk factors.

In her words, "We didn't link any of that to the fact that my mother's job was powered by May Plant, a coal-fired power plant just off the Wateree River. We lived by it, and we were exposed to these chemicals. But what we do know is that MATS is one of the several pollution standards that have helped clean up the environment in my community."

Ms. White's words were not just spoken on behalf of her and her two children but on behalf of the millions of kids across this country that live under a cloud of air pollution and dangerous brain-damaging toxins that inhibit their lives and limit their potential.

When the Agency proposed in February of 2019 to change key elements of the mercury and air toxic standards, claiming that, as a result of the extremely limiting accounting of the cost and benefits rules, the rule is not "appropriate and necessary," our mothers found that disingenuous and dangerous. The criteria of "appropriate and necessary" is a legal yardstick under the Clean Air Act, and removing this status undermines the legal foundation of the rule, leaving it vulnerable to legal challenge.

Furthermore, while EPA has continuously claimed that it's leaving the current standard for mercury emission in place, they are taking steps consistent with changing and/or altering the rule altogether. Not only does the proposal directly attack the underlying justification of MATS, but EPA specifically solicits comments on

whether, if it were to finalize its proposed conclusion, it then had the authority or the obligation to rescind the MATS rule altogether. This is an insult to the intelligence of mothers everywhere.

I previously served as Regional Administrator for the EPA Southeast Region under President Obama and EPA Administrator Gina McCarthy. My region covered eight States, six Tribes, and over a quarter of the Nation's population. My job was to not only assist communities and industry to implement MATS but also to explain the importance of these protective measures, especially in vulnerable communities and communities of color.

I also am a former mayor, having served my hometown of Greenville, Mississippi, for two terms. And I'm the mother of three, one of whom has joined me today. Mothers know that coal-burning power plants are the largest source of human-caused mercury emissions in the U.S., and mercury is harmful to the developing brain.

In 2005, researchers estimated that between 316,000 and 637,000 newborns were born each year in the U.S. with elevated mercury levels in their blood, levels associated with the loss of IQ. The resulting loss of intelligence and lost productivity was calculated to cost \$8.7 billion in 2000 dollars.

Everything we know about these pollutants show that controlling them is not just appropriate but vital. It's deeply problematic and a direct threat to our children's health that EPA now proposes to decide otherwise. Moms Clean Air Force, together with a diverse set of allies and partners, collected more than 350,000 comments in opposition to this proposal that were submitted to the docket.

So what should be done to the current rule? Nothing. If they choose to do anything at all, EPA must strengthen our Nation's limits on mercury and toxic pollution from coal-fired power plants.

I shared earlier that I have three children, and my greatest role is being a mother. My youngest son is 2 1A½. And when he plays with blocks, he likes to stack them into tall towers. He has sense enough to know that, if you pull the bottom block out, the rest of the tower will fall. If at 2 1A½ he has the good common sense to understand that foundations matter, why does this administration and agency not understand that pulling the base from a protective rule can make the rest of it crumble? Why they would ever consider weakening a rule that protects babies' brains is senseless, and this must be called out for what it is. It is a direct threat to our children's health, and we will not take these threats kindly.

Thank you.

[The prepared statement of Ms. McTeer Toney follows:]

**Before the United States House of Representatives
Committee on Energy and Commerce
Subcommittee on Oversight and Investigations**

**“Undermining Mercury Protections: EPA Endangers
Human Health and the Environment”**

**Testimony of Heather McTeer Toney
National Field Director
Moms Clean Air Force
May 21, 2019**

Chairwoman DeGette, Ranking Member Guthrie, and members of the Subcommittee, thank you for the opportunity to testify about the U.S. Environmental Protection Agency's Mercury and Air Toxics Standards.

My name is Heather Toney. I serve as National Field Director of Moms Clean Air Force, a community of over one million moms and dads united against air pollution and climate change for the sake of our children's health. I previously served as Regional Administrator for the Environmental Protection Agency's Southeast Region under President Barack Obama. I am also a former mayor, having served my hometown of Greenville, Mississippi, for two terms.

OVERVIEW

In February of 2019, Environmental Protection Agency (EPA) Administrator Andrew Wheeler formally [proposed](#) to withdraw a key underpinning of the Mercury and Air Toxics Standards (MATS), claiming that, as a result of an extremely limited accounting of the costs and benefits of the rule, the rule is not “appropriate and necessary.”¹ The “appropriate and necessary” finding is an important legal yardstick under the Clean Air Act, and undoing this finding undermines the legal foundation of the rule, leaving it vulnerable to legal challenge.

EPA has continuously claimed that it is [leaving the current standards for mercury emissions in place](#). But these claims are disingenuous and in direct conflict with the language of the proposed decision, which declares regulatory controls on mercury and other toxic emissions power plants “not appropriate.”

Not only does the proposal directly attack the underlying justification for MATS, but EPA specifically solicits—in the first paragraph of its proposal—comment “on whether the EPA has the authority or obligation to delist [power plants] and rescind” MATS.² Indeed, EPA devoted much of its proposal to exploring and soliciting comment on “alternative interpretations” of the Clean Air Act and governing case law, including “two separate theories” under which “EPA would have

¹ 84 Fed. Reg. 2670 (Feb. 7, 2019).

² *Id.* (emphasis added).

authority to rescind the MATS rule.”³ EPA specifically noted that it “retain[ed] the discretion ... to make changes in response to those comments prior to finalizing the rule.”⁴

Because this proposal threatens the health of our children, Moms Clean Air Force brought more than 20 moms from 15 states to DC in March 2019 to testify at the one public hearing that EPA held about the proposal to undermine MATS. Given the significance of the proposal, Moms Clean Air Force requested multiple hearings in many parts of the country, but EPA has not responded to this request. By holding only one hearing on this proposal, EPA is limiting the input from key stakeholders across the country.

This action must be called out for what it is: A direct threat to our children’s health. As parents, we find this unconscionable.

MERCURY AND AIR TOXICS: A SERIOUS AND FAR-REACHING HEALTH THREAT

Mercury is a highly toxic heavy metal that targets the nervous system. It occurs naturally in coal and when coal is burned without adequate pollution controls, mercury is released into the air. From there, it falls on waterways and can be transformed by microbial processes into methylmercury, and in this form enters the food chain. It then passes up the food chain into larger fish, birds, and mammals. Eating contaminated fish is a significant source of mercury contamination in people. Methylmercury bioaccumulates, or increases, with each level of the food chain, and attains its highest concentrations in species at the top of the food chain – including humans.⁵

Once we eat contaminated fish, methylmercury goes directly into the organs that have the most lipids, or fats, where it accumulates. It goes into our breasts and can be detected in human breast milk. It goes into our brains, where it can breach the blood-brain barrier. It goes into our umbilical cords, where it crosses the placental barrier to reach the fetus; a baby’s brain has the highest concentration of lipids of any organ in its body.

As EPA found when it issued MATS, coal burning power plants are the largest source of human-caused mercury emissions in the United States.

Mercury Harms Human Health

Mercury is harmful to the developing brain. Mercury causes brain neuron degeneration, impairing the growth of the brain in ways that interfere with learning and thinking. Infants and children are at the highest risk because the developing central nervous system is particularly sensitive to methylmercury. Fetuses are also at high risk as pregnant women can pass mercury through their placenta into the brains of their developing babies. When a woman is pregnant, the mercury in her blood can harm her baby, even if it does not cause her any immediate health problems. At the

³ *Id.* at 2678-79.

⁴ *Id.* at 2674.

⁵ *Mercury and Health: Key Facts*, World Health Org., <https://www.who.int/news-room/fact-sheets/detail/mercury-and-health> (last visited May 17, 2019)

highest levels of exposure the symptoms may be indistinguishable from cerebral palsy.⁶ But even at lower levels, prenatal exposure can cause neurological harm including reductions in IQ, decreased performance on motor speed and language tests, impeded memory function and increased likelihood of ADHD.⁷ Children exposed in utero can continue to exhibit adverse neurological effects throughout their lives.⁸

Mercury can also harm the health of older children and adults. It can negatively impact vision, motor function, hand-eye coordination, manual dexterity and muscular fatigue, and at higher levels can lead to coma and death.⁹ For those who consume large amounts of fish, the negative effects of methylmercury on cognitive function far outweigh the benefits of omega-3 fatty acids.¹⁰ Methylmercury has also been associated with acute coronary events, coronary heart disease and cardiovascular disease.¹¹ And methylmercury has been established as a possible carcinogen,¹² especially linked with leukemia and liver cancer.¹³

In 2005, researchers estimated that between 316,000 and 637,000 newborns were born each year in the United States with elevated mercury levels in their blood – levels associated with loss of IQ. The resulting loss of intelligence and lost productivity was calculated to cost \$8.7 billion in 2000 dollars. Some \$1.3 billion of that cost was attributable to mercury emissions from coal-fired power plants.¹⁴ In addition, a 2015 peer reviewed study found that compared to a scenario without additional

⁶ United Nations Env't Programme, *Global Mercury Assessment* 38 (2002), <http://wedocs.unep.org/bitstream/handle/20.500.11822/11718/final-assessment-report-25nov02.pdf?sequence=1&isAllowed=y>.

⁷ Margaret R. Karagas et al., *Evidence on the Human Health Effects of Low-Level Methylmercury Exposure*, 120 *Env'tl. Health Persp.* 799 (2012); Philippe Grandjean et al., *Calculation of Mercury's Effects on Neurodevelopment*, 120 *Env'tl. Health Persp.*, a452, a452 (2012).

⁸ Philippe Grandjean et al., *Cognitive Deficit in 7-Year-Old Children with Prenatal Exposure to Methylmercury*, 19 *Neurotoxicology & Teratology* 417, 417 (1997); Youssef Oulhote et al., *Aerobic Fitness and Neurocognitive Function Scores in Young Faroese Adults and Potential Modification by Prenatal Methylmercury Exposure*, 125 *Env'tl. Health Persp.* 677, 680 (2017).

⁹ United Nations Env't Programme, *Global Mercury Assessment* 38 (2002), <http://wedocs.unep.org/bitstream/handle/20.500.11822/11718/final-assessment-report-25nov02.pdf?sequence=1&isAllowed=y>.

Jean Lebel et al., *Neurotoxic Effects of Low-Level Methylmercury Contamination in the Amazonian Basin*, 79 *Env'tl. Res.* 20, 28 (1998).

¹⁰ Steven C. Masley, et al., *Effect of Mercury Levels and Seafood Intake on Cognitive Function in Middle-aged Adults*, 11 *Integrative Med.* 32, 32 (2012).

¹¹ See Jyrki K. Virtanen et al., *Mercury, Fish Oils, and Risk of Acute Coronary Events and Cardiovascular Disease, Coronary Heart Disease, and All-Cause Mortality in Men in Eastern Finland*, 25 *Arteriosclerosis, Thrombosis, & Vascular Biology* 228, 232 (2004).

¹² World Health Organization, Int'l Agency for Research on Cancer, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 58 Beryllium, Cadmium, Mercury, and Exposures in the Glass Manufacturing Industry*, 277–83 (1993), <https://monographs.iarc.fr/wp-content/uploads/2018/06/mono58.pdf>.

¹³ Nat'l Research Council, *Toxicological Effects of Methylmercury* 4 (2000), https://www.ncbi.nlm.nih.gov/books/NBK225778/pdf/Bookshelf_NBK225778.pdf.

¹⁴ Leonardo Trasande et al., *Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain*, *Environ. Health Perspec.*, 113(5): 590–596 (2005).

mercury and air pollution controls, MATS was projected to yield (by 2050) cumulative lifetime benefits of avoided exposure of \$147 billion for individuals affected, and cumulative economy-wide benefits (also by 2050) of \$43 billion.¹⁵

Other Harmful Toxics from Coal Plants

Coal fired power plants release significant amounts of other toxic metals such as arsenic, chromium and nickel, all of which are known or probable human carcinogens. And acid gases cause lung damage and contribute to asthma, bronchitis and other chronic respiratory disease, especially in children and the elderly.¹⁶ EPA also found that coal-burning power plants are the largest sources of many other hazardous air pollutants that cause serious health harms, including chromium, arsenic, nickel, selenium, hydrogen fluoride, hydrogen cyanide, and hydrogen chloride.¹⁷

Power plants also emit fine particulate matter (PM_{2.5}) that contributes to tens of thousands of premature deaths and hundreds of thousands of heart attacks, bronchitis cases, and asthma attacks every year.¹⁸ PM_{2.5} is associated with a host of adverse health effects, including decreased lung function, allergic responses, chronic obstructive pulmonary disease, lung cancer, and both acute and chronic cardiovascular effects.¹⁹ It has also been linked to infant mortality.²⁰ People with heart or lung diseases, children, and older adults are the most likely to be affected by particle pollution exposure.

The Mercury and Air Toxics Standards Are Working and Provide Massive Public Health Benefits

EPA finalized the Mercury and Air Toxics Standards for Coal- and Oil-fired power plants in 2011. These standards set the first-ever national limits for power plants on toxic mercury pollution, acid gases, and other toxic air pollution like arsenic and chromium. The standards ensure that 90% of the mercury in coal burned by power plants is not released to the air. They also cut acid gas emissions by 88%, lower sulfur dioxide emissions by 41% and reduce emissions of toxic metals like arsenic, chromium, nickel, cadmium, lead, dioxins, selenium, and more.

¹⁵ A. Giang & N.E. Selin, *Benefits of Mercury Controls for the United States*, PNAS, 288 (2015), <https://www.pnas.org/content/113/2/286>.

¹⁶ Environmental Protection Agency, Mercury and Air Toxics Standards, <https://www.epa.gov/mats/healthier-americans#impacts> (last visited May 17, 2019).

¹⁷ 77 Fed. Reg. 9,304, 9,310-11, 9,335 (Feb. 16, 2012).

¹⁸ Environmental Protection Agency, Mercury and Air Toxics Standards, <https://www.epa.gov/mats/healthier-americans#impacts> (last visited May 17, 2019).

¹⁹ E. Alfaro-Moreno et al., *Particulate Matter in the Environment: Pulmonary and Cardiovascular Effects*, Curr. Opin. Pulm. Med., 13:98-106 (2007); Annette Peters, Stephanie von Klot, Margit Heier, *Exposure to Traffic and the Onset of Myocardial Infarction*, N. Engl. J. Med. 351:1721-1730 (2004); Annette Peters et al., *Increased Particulate Air Pollution and the Triggering of Myocardial Infarction*, 103:2810-2815 (2001).

²⁰ T.J. Woodruff, J.D. et al., *Fine Particulate Matter (PM_{2.5}) Air Pollution and Selected Causes of Post-Neonatal Infant Mortality in California*, 114 Env'tl. Health Persp., 786, 786 (2006).

The standards are lifesaving. They protect our health from the grave impacts of air pollution – from mercury and dozens of other harmful pollutants. Controlling for mercury emissions has the added benefit of reducing other harmful pollutants. This means that the benefits of the standards reach beyond mercury reductions. In addition to protecting the developing brains of babies from mercury pollution, [according to EPA's own analysis](#), each year these standards prevent:

- 4,200-11,000 premature deaths
- 2,800 cases of chronic bronchitis
- 4,700 heart attacks
- 130,000 asthma attacks
- 5,700 hospital and emergency room visits
- 3,200,000 restricted activity days

These standards, along with other factors, have played an important role in reducing mercury emissions. Mercury emissions from power plants have [declined more than 80%](#) since the implementation of the standards. Mercury levels in Atlantic Bluefin tuna are now [rapidly declining](#) due to a shift away from coal. This shows us that the standards are working and that they are helping to clean up our waters – and protect the health of developing babies.

MOMS AND KIDS OPPOSE THE PROPOSAL TO WEAKEN THE MERCURY AND AIR TOXICS STANDARDS

EPA's mercury proposal would undermine life-saving, fully-implemented Mercury and Air Toxics Standards. There is broad opposition to this proposal not only from parents, children, and grandparents but also from doctors, nurses, faith leaders, anglers, conservationists, and more. Even the regulated industry itself opposes this proposal.

The proposal claims that MATS has provided only marginal health benefits, at too great a cost. This claim is based on an extremely narrow and badly distorted definition of what counts as benefits. Such a narrow definition hides significant health benefits (including thousands of real lives saved and illnesses avoided), so that the cost of compliance appears, falsely, to be unreasonably high. Ignoring the significant health benefits that accrue to tens of thousands each and every year due to the particulate reductions that occur as a result of MATS makes these benefits no less real or important for the people whose lives were extended, whose asthma attacks were prevented, or whose heart attacks were averted. Ignoring such benefits is a shell game played by an administrator and administration seeking to please coal company executives.

Moms Clean Air Force collected more than 22,000 comments in opposition to the proposal which we submitted to the EPA docket on the rule. Together with a diverse set of allies and partners, more than 350,000 comments in opposition to the proposal were submitted to the docket.

We also participated in person in the EPA public hearing on the proposal. More than 20 moms from 15 states came to DC in March 2019 to testify at the public hearing. Moms Clean Air Force and allies gathered these voices on behalf of more than one million members of Moms Clean Air Force, and for the sake of all children – who deserve to grow up without toxic mercury in their brains and bodies.

Kari Noble, Iowa

Kari Noble traveled to D.C. from Iowa to participate in the public hearing. Her daughter has a developmental disability. As the mother of a child who struggles with a brain-based disability, Kari felt she had to speak out to support an effective, fully-implemented national standards that protect children from preventable neurological harm.

“From both my personal experience as [my daughter’s] mom and as someone who has worked with people with disabilities in other settings, I know how hard it can be for children with brain-based learning difficulties.... I know these children struggle and it is especially sad when I see a child or adult with a brain-based disability that could have been prevented. I wonder what their lives would have been like if circumstances could have played out differently. Knowing that in high doses, mercury can irreparably harm the brain, among other major organs of the body, and that it is a neurotoxin especially dangerous to children, that it can impair the growth of the brain in a way that interferes with learning and thinking, I think about my daughter and other children who struggle, sometimes from conditions that could have been prevented. Brain damage from mercury is one of those conditions.

“Like many of the children I have worked with who have learning difficulties, my youngest daughter has struggled her whole life compared to her peers. I have watched this strong, determined child grow up to be a resilient, resourceful young lady who tirelessly works, on her own timeframe, to meet her goals. However, in certain educational environments, she has had to struggle every day to try to keep up with her peers and meet the expectations of teachers who sometimes have not understood her learning style and needs....

“Children who have brain damage due to mercury and other air borne toxins from coal-fired energy plants can face obstacles which can profoundly alter their life trajectory and limit their potential.”

Patrice Tomcik, Pennsylvania

Patrice traveled from Western Pennsylvania to deliver comments at the EPA hearing on the mercury proposal in March. Patrice lives in Gibsonia, close to two coal fired power plants within the greater Pittsburgh region – the Bruce Mansfield plant and the Cheswick Generating Station. As the mother of a child who is a cancer survivor, Patrice is adamant about the need to protect her son, whose immune system is compromised, from toxic pollution like mercury, arsenic, lead, chromium, and nickel. She asked EPA to withdraw the mercury proposal, because as a mother she cannot accept any attack on these health-protective standards.

“In Pennsylvania, there are 16 coal fired power plants and thanks to the Mercury and Air Toxics Standards, 90% of my state’s mercury pollution has decreased since 2011.... Because I live downwind from the Bruce Mansfield coal fired plant, I am concerned about the harmful pollution that spews out the stacks of the plant and what my children are breathing into their lungs.

“Children are especially vulnerable to air pollution because their bodies are still developing. My youngest son had cancer, and I know his immune system is compromised. Because I can’t control the air he breathes, I depend on the EPA to do their job and protect him. I appreciate that MATS provide significant public health benefits by reducing mercury, arsenic, chromium, and nickel emissions. In the process of reducing these pollutants, coal

plants also reduce deadly particulate pollution and other forms of harmful air pollution. According to the EPA's own analysis, these standards protect our health from the grave impacts of other harmful air pollution known to cause premature deaths, asthma, chronic bronchitis, heart attacks, providing even greater benefits to my children and my community."

Mary Lyons, Minnesota

Great Grandmother Mary Lyons is an Ojibwe elder from the Leech Lake Band of Ojibwe in Minnesota. She traveled to DC to defend her homelands, and all the waters, plants, and animals who live there. The hundreds of mercury advisories issued for water bodies in Minnesota are what drive this respected elder to ask EPA to withdraw a proposal that could undermine the mercury standards.

"My homelands consist of over 11,842 Lakes and Rivers.... In Minnesota, we have over 1500 bodies of water with fish advisories due to mercury contamination. We as indigenous peoples have always depended on our watersheds to carry unfiltered water to drink from and take care of the fish without harm. Our animals, our lands are filled with our medicines, our plants as well as our berries and most precious, our wild rice, are in harm if they are exposed to mercury contamination. We are a humble group of people, we believe to be caretakers of Mother Earth and as long as we take care of her, she will take care of us.

"The quality of our air is very precious to us as it is the power that keeps our body alive with each breath. We would rather breathe in clean air than depending on an inhaler to keep our airways open. We cannot afford to have high levels of toxins in the air and expect to live as we all were originally intended to.

"We are concerned about our newborns being effected through the mother's exposure, what quality of life will they both live. We all share in a common wish for our children, to live to be our age or older. I am urging the EPA to withdraw this proposal that would weaken our Mercury and Air Toxics Standards. What we are asking here is a human right, please honor the right of the peoples, the animals and the plants well-beings to grow in a manner that we do not have to be afraid of getting sick or extinct."

Donovan Watt, Maine

Donovan is a sixth grader who lives in South Portland, Maine. He traveled to DC with his mom in March to talk about the impact of mercury pollution on his beloved state. He is concerned about air quality in a place where, due to wind patterns, he breathes pollution coming from Midwest coal plants. He is also concerned about Maine's fisheries, which have among the highest mercury levels in North America.

"I enjoy spending time outdoors. Whether it's playing basketball, or just riding my bike through the neighborhood, I cherish the quality of my community's environment.... I believe that weakening the standards... is a terrible mistake that will directly affect my family and my state.

"Our country's wind patterns bring air pollution from other states to our community in South Portland, Maine. So allowing more air toxins to enter our skies would affect Maine even more than other states. Personally, I have a lot of friends and peers who already suffer

from asthma and if the air quality gets worse, it will be that much more dangerous for them. I also have a little brother and a little sister who would be affected by this pollution if you pollute our air.

“In my state, fishing is one of the biggest businesses and we are known for some of the best seafood in the world. But there is already a health advisory on mercury issued by the state that says that children and pregnant women cannot safely eat a meal with fish more than twice in a week. If you allow more mercury to be released into our air, it will make eating seafood even more dangerous, and it could weaken the fishing economy in our state. Maine could possibly lose a large amount of money, also, because mercury levels in Maine fish are already among the highest in North America. If we roll back regulations on mercury levels, it will get worse.”

Nikki Katrice White, South Carolina

Nikki is a native of Camden, South Carolina, where she lives with her two children and works in the healthcare industry. As a black mother living in the shadow of the local coal-fired May Plant that powered the textile factory where her own mother worked, Nikki is acutely aware of the need for strong air pollution controls to protect children and families from exposure to mercury and other toxic byproducts of burning coal. She traveled to DC to participate in the EPA hearing on the MATS proposal because she has seen firsthand the importance of strong national standards to reduce pollution, and because she wanted to speak up for communities of color living near power plants.

“Let me tell you a little bit about Camden, SC. It’s one of those small, quaint towns where everyone knows everyone. It’s a town where you might attend church with your coaches and teachers. It’s a town where football and basketball on Fridays is the place to see everyone. It’s also a town full of manufacturing plants and manufacturing employees.

“My mother was one of those employees. For 20 plus years, she served at Skyline and Wateree Textiles. The insurance was great and the pay was well above the norm for the small town of Camden where most people of color live below the poverty line. We were grateful; and blissfully unsuspecting. We didn’t think twice when my mother gave birth to her only son; he was stillborn. We didn’t think twice when my mother and sister developed fibroids, because, well, ‘they are common in African-American women.’ We didn’t even think twice when my children started to have respiratory issues when there was no family history or other significant risk factors. My daughter, Kendra, started having symptoms around 3 months of age. By the time she was a toddler, she was diagnosed with asthma. My son Xavier has had respiratory issues from infancy and even as an adult, he still struggles to get a handle on them.

“We didn’t link any of that to the fact that my mother’s job was powered by May Plant, a coal-fired power plant just off the Wateree River. She breathed in those toxins daily and brought home the residue on her clothes, in her hair and even in her car. We were exposed to these chemicals....

“MATS is one of several pollution standards that have helped clean up the environment in my community. We need national standards to protect us from pollution so that May Plant and other industrial facilities stop harming our babies.

“MATS has protected mothers, mothers to be, babies and workers. It has protected the vulnerable population that thrives on manufacturing employment and fishing to provide for their families. It helped make sitting at those football games more bearable because we were at ease about the air we were taking in.

“As a member of the quaint, intimate town of Camden, I have seen firsthand the value of national standards that keep pollution out of our air, water, and soil. That’s why it is of utmost importance to keep the MATS protections strong. Our communities deserve that right; my mother deserved that right. My children deserved that right.”

IN ADDITION TO OPPOSITION FROM MOMS AND KIDS, A BROAD, DIVERSE COALITION OPPOSES EPA’S PROPOSAL TO UNRAVEL THE MERCURY AND AIR TOXICS STANDARDS

Over 350,000 comments have been submitted to EPA in response to their proposal to undermine MATS. Individuals and organizations representing broad, diverse constituencies including mothers, medical professionals, health groups, the NAACP, the utility sector, scientists, labor, tribes, faith groups, environmental groups, states, anglers, pollution control technology providers, and more have weighed in to support leaving the standards in place and to express concerns over EPA’s proposal. Excerpts from some of the comments EPA has received are below.

“Our organizations represent health and medical professionals who treat patients and work in communities impacted by lung, cardiovascular, and neurological impairments, and we are therefore keenly aware of the harmful health effects of air pollution. Research has shown that these toxics are especially dangerous because of the harm they can cause to the respiratory, cardiovascular, nervous, endocrine, and other essential life systems within humans. Toxic emissions can even cause developmental disorders and premature death... “Preventing 11,000 premature deaths meets the essential, explicit responsibility the Clean Air Act gave EPA in Section 112. Millions of Americans, including our patients and our communities, face special risk should EPA decide that this narrowed approach is acceptable. Their age, health conditions, or rate of exposure to these pollutants make them more vulnerable, and consequently, make these measures even more “appropriate and necessary.” They include infants, children and teenagers; older adults; pregnant women; people with asthma and other lung diseases; people with cardiovascular diseases; diabetics; people with low incomes; and people who work or exercise outdoors.” [Comments from 16 health and medical associations](#) ²¹

“Given this investment [by the power industry to meet the standards] and industry’s full implementation of MATS, regulatory and business certainty regarding regulation under Clean Air Act (CAA) section 112 is critical—we urge that EPA leave the underlying MATS rule in place and effective...EPA should take no action that would jeopardize these investments or the underlying rule. Should EPA take any action that could result in the rescission of the underlying MATS rule, despite the above request, EPA should consider the impacts such an action would have on these costs already borne by industry and how the

²¹ Signatories include the Alliance of Nurses for Healthy Environment, American Lung Association, March of Dimes, the National Association of County and City Health Officials, and the National Medical Association.

recovery of these sunk costs could be put in jeopardy...” [Letter signed by Edison Electric Institute, National Rural Electric Cooperative Association, International Brotherhood of Electric Workers, etc.](#)

“Today, regulated power plants are in full compliance with the standards, achieving a ninety-six percent reduction in power-plant hazardous air pollution emissions—including an eighty-six percent reduction in power-plant mercury emissions. Those reductions have generated, and continue to generate, significant public health, environmental, and economic benefits for the States and Local Governments—and at a fraction of the predicted cost. Because power-plant mercury emissions traverse state borders, the national mercury emission limits provided by the MATS Rule are a critical buttress to state-level mercury emission control regimes.” [Comments on behalf of 21 states and 6 counties and cities](#)

“In 1990, Congress listed mercury – along with one hundred and eighty-eight other air toxics such as lead and arsenic – as hazardous air pollutants in the Clean Air Act. We believe the Environmental Protection Agency (EPA) correctly implemented Congress’ original intent when the agency issued the MATS rule in 2012. Modeling MATS on state actions that were already underway to address these pollutants, EPA issued standards that were achievable for industry and beneficial for public health and the environment. EPA also provided enough time for industry to comply with the new standards. Thus, EPA struck the right balance between protecting the environment, public health and our economy. For these reasons and more, we strongly supported the MATS rule when it was finalized and still support the rule today.” [Senators Alexander\(R-TN\) and Carper \(D-DE\)](#)

“ICAC is confident that the EGU’s emission limits for existing units for total particulate matter (PM), hydrogen chloride (HCl) and mercury (Hg) are being met reliably and economically... We believe that the MATS emission limits should be retained for existing units.” [Institute of Clean Air Companies](#)

“Since EPA completed the MATS Regulatory Impact Analysis (“RIA”) in 2011, the scientific literature has developed significant new evidence demonstrating the benefits of regulating power plant mercury emissions...In addition, it is now clear that reductions in mercury emissions from power plants result in localized and regional reductions in atmospheric mercury deposition, which amplifies the benefits of decreasing domestic emissions.” [Emmett Environmental Law & Policy Clinic, Harvard Law School](#)²²

“Exelon actively supported the Mercury and Air Toxics Standards, and the underlying “appropriate and necessary” finding, in the U.S. Court of Appeals for the District of Columbia Circuit and before the U.S. Supreme Court. There is no basis to repeal these important and long-overdue protections.” [Exelon Corporation](#)

“Nationwide, over 200 federally recognized tribes have reservation lands within 50 miles of an EGU. While mercury is a major concern for these tribes, emissions of other highly toxic substances are also present, including carcinogens, acid gases, arsenic, nickel, and

²² Signatories include “scientists from the fields of atmospheric transport, ecosystem fate and effects, bioaccumulation, human exposures, and health outcomes associated with environmental mercury contamination.”

lead...Moreover, mercury deposition threatens more than the physical and economic well-being of tribal members, it also threatens the tribe's culture and spiritual wellbeing. Specifically, the people of Fond du Lac are essentially people from a water based culture, this is demonstrated by the fact that where we live and how we live centers on water and associated resources. Natural resources and culture are greatly intertwined, so when natural resources are contaminated or lost, likewise are the associated cultural practices. The most obvious example of this would be the growing reluctance by many tribal members to eat fish frequently. Fish was a major component of Anishinaabe diet until the last several decades. There are several reasons for the decline in consumption of fish, but the fact that a majority of the water bodies in Minnesota are impaired by mercury makes it even more difficult to encourage consumption of fish to tribal members." [Fond du Lac Band of Lake Superior Chippewa](#)

"The health benefits of the standards are enormous – they prevent up to 11,000 deaths, along with 130,000 asthma attacks among children, and 4,700 heart attacks every year. The standards reduce some of the most hazardous air pollutants emitted by power plants, including pollutants known to cause cancer, or birth or reproductive impacts, respiratory impacts, impaired brain development in children and other harms to human health." [Letter signed by over 30 groups](#)²³

"Mercury emissions harm Indian health disproportionately because many American Indians rely much more heavily on locally caught fish for their daily sustenance than does the general public. EPA has determined that many American Indians' "average exposures to methylmercury may be more than two-times greater than those experienced by the average population." Mercury Study Report, Vol. 4 at 7-2; id. at Vol. 7 at 2-2 ("[S]ome Native American populations report fish consumption rates far in excess of the general population."). Indeed, for many tribes, fish consumption rates are so high that EPA's estimate of two-times greater exposure may be a gross underestimate. "Some indigenous subpopulations eat 4 to 5 times the amount of fish assumed in EPA models that determined fish consumption advisories." [National Congress of American Indians et. al](#)

INDUSTRY WILL AND HAS IN THE PAST TURNED OFF POLLUTION CONTROLS

EPA's proposal, if finalized, could undermine the legal basis of the Mercury and Air Toxics Standards even if EPA purports to find regulation "not appropriate" but leaves the MATS controls in place. Through the dangerous and false assertion that regulating harmful neurotoxins and carcinogens is neither appropriate or necessary, the proposal could open the door for legal challenges that would attempt to vacate the MATS rule in its entirety.²⁴ And that presents a grave

²³ Signatories include the NAACP, National Hispanic Medical Association, Chippewa Ottawa Resource Authority, Hispanic Federation, WE ACT for Environmental Justice, Alaska Community Action on Toxics, Moms Clean Air Force, Natural Resources Defense Council, Environmental Defense Fund, and the Evangelical Environmental Network.

²⁴ Murray Energy Corporation, which already has a pending challenge to MATS, D.C. Cir. No. 16-1127, has taken the position that EPA must repeal the MATS standards if the agency makes a "not appropriate" finding. Cody Nett, Assistant General Counsel for Murray Energy Corp., Public Hearing Comments on "Reconsideration of Supplemental Finding and Residual Risk and Technology Review for Coal- and Oil-Fired Utility Steam Generating Units" at 2 (Mar. 18, 2019),

threat to public health. In the absence of enforceable federal standards for harmful pollution, there is nothing to guarantee that the power industry would continue to operate pollution controls now limiting mercury and acid gases from power plants.

In the event this proposal is finalized, the risk of pollution controls for mercury and other toxics being throttled down or turned off is real. In a recent Integrated Resource Plan filing by the Northern Indiana Public Service Company LLC (NIPSCO), Peabody COALSLES provided comments on February 28, 2019 which demonstrate the risk that facilities may be compelled to reduce utilization of already-installed controls in order to reduce operating & maintenance costs and that this is being discussed as part of resource planning:

Although NIPSCO understandably installed MATS compliance equipment initially, it is inappropriate for NIPSCO to continue assuming they will incur long-term MATS O&M costs for these electric power-generating units. There is a significant likelihood that EPA will withdraw MATS entirely or drastically alter the rule as to reduce the ongoing O&M cost burden. Therefore, NIPSCO's assumption to build these high O&M costs into its IRP is unreasonable. Additionally, NIPSCO's prudence should be questioned given its lack of support for EPA's current opportunity to withdraw MATS and eliminate the costs that EPA has concluded are unreasonable...

The EPA's current proposal regarding the MATS rule could be subject to legal challenge and force it to go through the de-listing process in § 112(c)(9). Some parties may argue that § 112 requires an "appropriate and necessary" finding before EGUs can be regulated. As a result, withdrawing the "appropriate and necessary" finding but leaving the MATS requirements in place could be found to violate the plain language of the statute, and the EPA may therefore lack the authority or the discretion to proceed with the rule as proposed.

NIPSCO is relying in part on the costs of compliance with MATS as a reason for shuttering some of its EGUs. These costs of compliance are the costs found by the EPA to be unreasonable and unnecessary. Furthermore, these costs include both the cost of installing controls and ongoing operation and maintenance costs. Even where controls have been installed because of the MATS rule, these operation and maintenance costs could be avoided if, as seems likely, the EPA abandons the MATS requirements for EGUs, either in the final version of the 2018 Supplemental Finding or as a result of an adverse court decision.²⁵

In the past, even after massive capital investments in pollution control equipment, power plants have turned off their pollution controls when enforceable pollution limits have not been in place. The industry would likely do the same if EPA repeals MATS. For example, under the Clear Air Interstate Rule (CAIR) program from 2010-2014, smog-causing emissions of nitrogen oxides (NOx) dramatically increased as compared to pre-CAIR levels from many coal-fired power plants in the

Doc. ID No. EPA-HQ-OAR-2018-0794-0523 (arguing that EPA "must also take the only logical and defensible next step by rescinding MATS altogether").

²⁵ See Peabody's Comments on NIPSCO's 2018 Integrated Resource Plan at 13-14, [https://www.in.gov/iurc/files/Peabody%20Public%20IRP%20Comments%20\(4850-6099-4953\).pdf](https://www.in.gov/iurc/files/Peabody%20Public%20IRP%20Comments%20(4850-6099-4953).pdf)

Eastern U.S. with advanced NO_x controls—specifically selective catalytic reduction (SCR)—already installed.²⁶ This occurred where power plants lacked enforceable pollution limits and market forces—including low CAIR allowance prices, low natural gas prices, and lower electricity demand—incentivized emission increases.²⁷ More recently, under the Cross-State Air Pollution Rule program, the Ozone Transport Commission has observed that many coal-fired power plants with SCR installed have emitted NO_x at significantly higher rates than their lowest observed emission rates in prior years. For example, during the 2018 ozone season, 17 of the 25 top NO_x-emitting power plants impacting the Ozone Transport Region had SCR installed.²⁸ The top 2 emitters, the WH Zimmer Generating Station in Ohio and the Belews Creek Plant in North Carolina, emitted NO_x at rates that were over 3 times and over 8 times their best observed rates from 2006 and 2007, respectively.²⁹ Therefore, it is critically important to maintain MATS to ensure that we continue to realize their profound benefits for human health and the environment.

PROTECTING AMERICA FROM MERCURY AND AIR TOXICS IS APPROPRIATE AND NECESSARY – AND A MORAL IMPERATIVE FOR OUR CHILDREN

The Proposal's Bottom-Line Finding Is Indefensible

EPA's position in the proposal is that it is not "appropriate" to regulate coal-burning power plants' massive emissions of mercury and other hazardous air pollutants that gravely harm human health and the environment.³⁰ Everything we know about these pollutants, and the overwhelming record before EPA, shows that controlling them is not just "appropriate," but *vital*. It is deeply problematic and a direct threat to our children's health that EPA now proposes to decide otherwise. Supporters of this irresponsible proposal should not be allowed to hide the central fact that the agency charged with protecting American's health and welfare from air pollution is claiming that control of largescale toxic emissions is not appropriate.

Contrary to EPA's False Claims, Health Benefits of HAP Reductions Are Enormous

Emissions of hazardous air pollutants ("HAPs") from electric generating units ("EGUs")—previously the United States' largest sources of HAPs including mercury, chromium, arsenic, nickel, selenium, hydrogen fluoride, hydrogen cyanide, and hydrogen chloride—have fallen by 96 percent since 2015, in large part due to the adoption of MATS.³¹ EPA's claim that the HAPs reductions are of minor value (reflected by an estimate of merely \$4-\$6 million in annual benefits) is outright false. EPA uses that sum even though the agency has previously acknowledged that it represents only a

²⁶ Thomas F. McNevin, *Recent increases in nitrogen oxide (NO_x) emissions from coal-fired electric generating units equipped with selective catalytic reduction*, 66 *Journal of the Air & Waste Mgmt. Ass'n.*, 66, 74 (2016).

²⁷ *Id.*

²⁸ OTC/MANE-VU Joint Committees' Meeting, Stationary and Area Sources Committee Presentation at 4 (Apr. 11, 2019),

https://otcair.org/upload/Documents/Meeting%20Materials/OTC_SAS_Presentation_Public_04112019.pdf.

²⁹ *Id.*

³⁰ See 42 U.S.C. § 7412(b)(2) (HAPs are chemicals that are "carcinogenic, mutagenic, teratogenic, neurotoxic," "cause reproductive dysfunction," or have "acutely or chronically toxic" or "adverse environmental effects").

³¹ 84 Fed. Reg. at 2689 (Table 4); see also 77 Fed. Reg. at 9,310-11, 9,335.

tiny *subset of a subset* of the health benefits of controlling mercury emissions.³² EPA ignores published studies showing that the monetized benefits of reducing mercury alone are orders of magnitude greater, and valued in the billions annually.³³ The dramatic reductions in pollution from the nation's largest sources that MATS provides are a huge benefit to public health, and have been systematically under-valued by the current proposal. This false representation of the scale of health benefits provided by MATS vastly undervalues the enormous health benefits that our children, our elders, and all Americans have experienced as a result of MATS implementation.

Power-Plant Air Toxics Emissions Disproportionately Harm Vulnerable Populations Including Minorities and Children

Emissions of mercury and other air toxics disproportionately harm vulnerable populations, including Native American tribes where fishing is a vital part of tribal culture and where tribal members traditionally consume fish at higher rates than the general population.³⁴ EPA also identified disproportionate risks of mercury exposure for other minorities, including African-Americans living below the poverty line in the southeast who rely on fish they catch for food.³⁵ In addition, EPA previously recognized that children and developing fetuses are especially vulnerable to health hazards from HAP emissions from power plants—risks that, except for IQ loss for children born to mothers who live in households that fish recreationally—remain unquantified by the agency. As EPA stated in the proposed MATS rule:

Children are at greatest risk of adverse health effects from exposures to Hg [mercury], and this risk is amplified for children in minority and low income communities who subsist on locally-caught fish.... Even before birth, the developing fetus may be exposed to HAP through the mother that affect development and permanently harm the individual.³⁶

As a result of the disproportionate harm to children and other vulnerable populations, and because these disproportionate burdens have not been addressed by EPA, the current proposal dangerously ignores Congress's special concern in Section 112 about protecting vulnerable and sensitive populations.³⁷

³² 80 Fed. Reg. 75,025-75,040 (Dec. 1, 2015); 81 Fed. Reg. 24,420, 24,441 (Apr. 25, 2016).

³³ In a 2015 peer-reviewed study, Amanda Giang and Noelle Selin of the Massachusetts Institute of Technology found that compared to a scenario without additional mercury and air pollution controls, MATS was projected to yield (by 2050) cumulative lifetime benefits of \$147 billion (2005 USD, discounted at 3%) for individuals affected, and cumulative economy-wide benefits (also by 2050) of \$43 billion. A. Giang & N.E. Selin, *Benefits of mercury controls for the United States*, PNAS (2015).

³⁴ See 81 Fed. Reg. at 24,442.

³⁵ See MATS RIA at 7-40 through 7-44; Proposed MATS rule, 76 Fed. Reg. 24,976, 25,018 (May 3, 2011) (noting that “populations with high levels of self-caught fish consumption,” including African-American communities, “are likely to be disproportionately affected” from exposure to mercury).

³⁶ 76 Fed. Reg. at 25,018.

³⁷ See, e.g., Clean Air Act § 112(c)(9)(B)(i) (requiring consideration of cancer risk “most exposed” individual); § 112(n)(1)(C) (requiring consideration of mercury hazards from fish consumption “including consumption by sensitive populations”).

Mercury Pollution Has Profoundly Impaired Waters Throughout the Country

As a result of methylmercury contamination, waters throughout the United States have been subject to mercury advisories warning all people, or those in sensitive groups (such as pregnant individuals), not to eat fish caught in those waters.³⁸ In 2012-2013, in some states, all, or nearly all, waters were unsafe for fish consumption due to mercury contamination.³⁹ This widespread contamination created preventable exposure of women and children to a potent neurotoxin. It also diminished recreational opportunities, reduced property values, and prevented access to a ready and affordable source of nutritious food. Controlling power plants' toxic emissions is a critical step to clean up these waters.

EPA MUST STRENGTHEN OUR NATION'S LIMITS ON MERCURY AND OTHER TOXIC POLLUTION FROM COAL PLANTS

As EPA notes in its proposal, coal- and oil-fired electric generating units still emit over 5,000 tons of hazardous air pollutants each year. EPA also found that 636,000 people are at increased risk of cancer at or exceeding a one-in-one million level, based on allowable emissions under the Mercury and Air Toxics Standards. Rather than revisiting these life-saving standards, EPA should be strengthening them to reduce hazardous air pollutants further from these sources, to better protect the health of children, families, and communities living near these facilities and downwind from them. That EPA is going in the opposite direction, and proposing to undermine vital safeguards already on the books, is unconscionable.

³⁸ See 65 Fed. Reg. 79,825, 79,827 (Dec. 20, 2000); U.S. EPA, 2011 National Listing of Fish Advisories, EPA-820-F-13-058 (2013), <https://19january2017snapshot.epa.gov/sites/production/files/2015-06/documents/technical-factsheet-2011.pdf>.

³⁹ See Brief for State and Local Govt. Respondents at 8 & n.7, *Michigan v. EPA*, 135 S. Ct. 2699 (2015) (No. 14-46).

Ms. DEGETTE. Thank you very much.

The Chair now recognizes Mr. Livermore for 5 minutes for an opening statement.

STATEMENT OF MICHAEL A. LIVERMORE

Mr. LIVERMORE. Madam Chair, Ranking Member Guthrie, members of the committee, thank you for the opportunity to testify today. My testimony will focus on the treatment of cost and benefits in EPA's current proposal.

The use of cost-benefit analysis to evaluate environmental regulation has a long history in the United States and has been embraced by administrations of both political parties. Cost-benefit analysis creates a formal process for a simple idea: Agencies ought to do their best to anticipate and evaluate the consequences of their decisions and seek out rules that provide large benefits at low cost. Over time, approaches for counting cost and benefits have become standardized. Guidance documents, such as OMB's Circular A4, which was published during the George W. Bush administration, described best practices for how agencies should do this.

A value of these best practices is maintaining consistency between agency decisions. One major critique leveled against the practice of cost-benefit analysis is that it's vulnerable to manipulation by agencies that want to provide ad hoc rationalization for policy choices that are based on political expediency.

Well-established best practices reduce this threat because they create a clear standard that can be used to hold agencies accountable. If an agency departs from established methods, that raises a red flag, alerting the public and oversight officials to the possibility of manipulation. The larger the departure from established practices, the stronger the reason that the agency has to give for its departure.

In EPA's current proposal, the Agency does, in fact, depart from established methods of conducting cost-benefit analysis, raising that red flag that the Agency is more interested in providing cover for a decision than in truly understanding the consequences of its actions.

EPA's earlier analysis of the MATS rule, which was undertaken under the Obama administration, projected \$9.6 billion per year in compliance costs and between \$37 billion and \$90 billion per year in quantified benefits in addition to substantial unquantified health and environmental benefits.

Contradicting the relevant guidance and decades of practice by administrations of both political parties, the current proposal functionally ignores the largest class of benefits associated with the MATS rule. And this is life savings—let's just be clear about what these benefits are—they're life savings for many thousand Americans. The result is a biased and misleading estimate that creates the false impression that the MATS rules were not justified in cost-benefit terms.

The grounds that the EPA provides for functionally ignoring these benefits is that they are indirect cobenefits that result from exposure to particulate matter—or a reduction in exposure to particulate matter. These particulate matter benefits occur as a result of the pollution-control technologies that are used by firms to com-

ply with the MATS rule. The A4 Circular, which again was adopted during the Bush administration, and EPA's own peer-reviewed guidance on conducting cost-benefit analysis direct the Agency to analyze both direct and indirect cost and benefits. Since President Reagan, EPA has counted cobenefits in many regulatory contexts, including many other Clean Air rules. The Agency fails to provide any adequate reason for this extraordinary and abnormal treatment of cobenefits. Nothing in either the relevant case law or the statute require the Agency to functionally ignore tens of billions of dollars of regulatory benefits.

If finalized and adopted, the proposal would not only undermine a socially desirable environmental policy; it would create a dangerous precedent of agencies departing from established methods when it is politically convenient to do so, which would open the door in the future to flagrant manipulation of cost-benefit analysis. Such a trend would result in inefficient regulation because we're no longer adequately doing the analysis and would further erode public confidence in government.

I am happy to answer any followup questions that you may have.
[The prepared statement of Mr. Livermore follows:]

Testimony of
Michael A. Livermore
Professor of Law
University of Virginia
before the
Subcommittee on Oversight & Investigations
House Committee on Energy and Commerce
May 21, 2019

Introduction

Thank you for inviting me to testify before this subcommittee. My name is Michael Livermore and I am a professor of law at the University of Virginia. My areas of research include environmental law and economics, regulatory oversight, and cost-benefit analysis.

My published work in these areas include books that examine the practice of cost-benefit analysis and regulatory oversight in the United States and globally,¹ a casebook that emphasizes the economic perspective on environmental law and policy,² and over two dozen articles, book chapters, and shorter works that focus on cost-benefit analysis, regulatory oversight, and environmental law and policy.³ Much of my recent work on these subjects is carried out in interdisciplinary collaboration with researchers in other fields, including economics, neuroscience, and the physical sciences.⁴

My testimony today will focus on the treatment of costs and benefits in a proposal by the Environmental Protection Agency (EPA) to withdraw its earlier finding that it was appropriate and necessary to regulate the

¹ *The Globalization of Cost-Benefit Analysis in Environmental Policy* (Oxford University Press, 2013) (ed. with Richard L. Revesz); *Retaking Rationality: How Cost-Benefit Analysis Can Better Protect the Environment and Our Health* (Oxford University Press, 2008) (with Richard L. Revesz).

² *Environmental Law and Policy* (Foundation Press, 2019) (4th ed. with Richard Revesz, Caroline Cecot, and Jayni Foley Hein).

³ See e.g., “Economics and Environmental Law Scholarship,” in *Perspectives on Environmental Law Scholarship: Essays on Purpose, Shape and Direction* (Cambridge University Press, Ole W. Pedersen ed., 2018) (with Caroline Cecot); “The Perils of Experimentation,” 126 *Yale Law Journal* 636 (2017); “Environmental Law and Economics,” in *Oxford Handbook of Law and Economics* (Oxford University Press, Francesco Parisi, ed., 2017) (with Richard L. Revesz); “Setting the Social Cost of Carbon,” in *Climate Change Law* (Edward Elgar, Encyclopedia of Environmental Law, Daniel Farber and Marjan Peeters eds., 2016); “Cost-Benefit Analysis and Agency Independence,” 81 *University of Chicago Law Review* 609 (2014); “Rethinking Health-Based Environmental Standards,” 89 *New York University Law Review* 1184 (2014) (with Richard L. Revesz); “Balanced Job Impact Analysis,” in *Does Regulation Kill Jobs?* (University of Pennsylvania Press, Cary Coglianese, Adam Finkel & Christopher Carrigan, eds., 2014) (with Jason Schwartz); “Patience is an Economic Virtue: Real Options, Natural Resources, and Offshore Oil,” 84 *University of Colorado Law Review* 581 (2013); “Regulatory Review, Capture, and Agency Inaction,” 101 *Georgetown Law Journal* 1337 (2013) (with Richard L. Revesz).

⁴ See e.g., “Sociopolitical Feedbacks and Climate Change,” 43 *Harvard Environmental Law Review* 119 (2019) (with Peter Howard); “The Measurement of Subjective Value and Its Relation to Contingent Valuation and Environmental Public Goods,” 10(7) *PLoS ONE* e0132842 (2015) (with Mel W. Khaw, Paul Glimcher, Denise Grab, and Christian Vossler); “Global warming: Improve economic models of climate change,” 508 *Nature* 173 (April 10, 2014) (with Kenneth Arrow, Lawrence H. Goulder, Peter H. Howard, Robert E. Kopp, Michael Oppenheimer, Richard L. Revesz and Thomas Sterner).

emissions of hazardous air pollutants (“HAPs”) from coal- and oil-fired electric utility steam generating units (“EGUs”) (“the Proposal”).⁵

My main conclusions regarding the Proposal are as follows:

- EPA’s earlier findings that regulation of HAPs from EGUs is appropriate and necessary were extremely well-justified in cost-benefit terms. The Mercury and Air Toxic Standards (“MATS”) Rule was projected to impose \$9.6 billion per year in compliance costs and yield between \$37 billion and \$90 billion per year in quantifiable benefits, in addition to substantial unquantified health and environmental benefits.⁶
- Contradicting the relevant guidance and decades of practice by administrations of both political parties, the Proposal functionally ignores “co-benefits” associated with the regulation of HAPs from EGUs, resulting in a biased and misleading estimate of costs and benefits. The Proposal provides no adequate explanation for its extraordinary and abnormal treatment of co-benefits.
- The Proposal does not undertake an adequate investigation of the many benefits of the regulation of HAPs from EGUs that were discussed in a qualitative fashion in the 2012 MATS Rule.
- The Proposal’s treatment of regulatory costs is irrational. It fails to acknowledge the overestimation of regulatory costs associated with the 2012 MATS Rule. Of greater importance is that regulated actors have made considerable, non-reversible investments to comply with the 2012 MATS Rule—the going-forward costs of regulating HAPs from EGUs is far lower than the cost estimates relied on in the Proposal.

In short, the Proposal departs from established methods of conducting cost-benefit analysis that are backed by several decades of practice by administrations of both political parties. The agency fails to provide any adequate reason for this departure as a matter of economics, public policy, or law. The resulting analysis creates the misleading impression that the appropriate-and-necessary finding and the MATS Rule—which generated many billions of dollars in quantified net benefits as well as considerable unquantified benefits for the American public—were not justified in cost-benefit terms. If finalized and adopted, the Proposal would not only undermine a socially desirable environmental policy; it would create a dangerous precedent of agencies departing from established methods when it is convenient to do so, opening the door to the flagrant manipulation of cost-benefit analysis. Such a trend would result in inefficient regulation and the erosion of public confidence in government decision-making.

Cost-Benefit Analysis and Regulation

The use of cost-benefit analysis to evaluate environmental regulations has a long history in the United States. Although there are important precursors,⁷ the central place of cost-benefit analysis in federal regulatory decision-making can be traced to Executive Order 12291, signed by President Ronald Reagan shortly after taking office in 1981.⁸ Under that order, agencies were required to conduct a Regulatory Impact Analysis of proposed rulemakings with significant economic consequences and submit those analyses to the Office of Information and Regulatory Affairs (OIRA) in the White House for review. The Reagan Order’s stated purposes included to “increase agency accountability for regulatory actions” and “insure well-reasoned

⁵ Reconsideration of Supplemental Finding and Residual Risk and Technology Review, 84 Fed. Reg. 2670, 2670 (Feb. 7, 2019).

⁶ National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial- Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9303 (Feb. 16, 2012). EPA, Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards (Dec. 2011).

⁷ Jim Tozzi, “OIRA’s Formative Years: The Historical Record of Centralized Regulatory Review Preceding OIRA’s Founding,” 63 *Administrative Law Review* 37, 40–62 (Special Edition 2011) (giving a historical overview of review before the Reagan administration).

⁸ Executive Order 12291, 46 Fed. Reg. 13193 (1981).

regulations.” Order 12291 established general guidelines for conducting Regulatory Impact Analysis that required:

- A description of the potential benefits of the rule, including any beneficial effects that cannot be quantified in monetary terms . . .
- A description of the potential costs of the rule, including any adverse effects that cannot be quantified in monetary terms . . . [and]
- A determination of the potential net benefits of the rule, including an evaluation of effects that cannot be quantified in monetary terms.⁹

In 1993, President Bill Clinton issued an updated version of the Reagan Order that left the basic architecture of regulatory impact assessment and OIRA review intact.¹⁰ Among the regulatory principles embraced by the Clinton Order is a directive to agencies to “assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs.”¹¹ Subsequent Presidents have continued under the Clinton Order: the tradition of cost-benefit analysis and regulatory review has now extended for nearly four decades.¹²

The requirement of cost-benefit analysis creates a formal process for a simple idea: agencies ought to do their best to anticipate and evaluate the consequences of their decisions. The cost-benefit standard urges agencies toward decisions that maximize net benefits by seeking out rules with the largest possible benefits at the lowest possible cost.

But although the idea of cost-benefit analysis might be straightforward, accurately estimating and valuing the wide range of effects from major rulemakings is no easy task.¹³ Over the four decades of cost-benefit analysis practice, agencies have developed a number of methods and approaches for conducting Regulatory Impact Analysis. These best practices have been collected in relevant guidance document such as Circular A-4,¹⁴ published by the Office of Management and Budget during the George W. Bush administration, and EPA’s peer-reviewed Guidelines for Preparing Economic Analyses.¹⁵

Cost-benefit analysis best practices serve several roles. Most obviously, they conserve agency resources by providing a set of standardized approaches that can be applied in many different regulatory contexts. But they also serve a second purpose of maintaining consistency between agency decisions. One major critique leveled against the practice of cost-benefit analysis is that its technical nature makes it vulnerable to manipulation. Were an agency to decide on a regulatory course of action on other grounds—such as political expediency—the concern is that the agency could construct a plausible-seeming cost-benefit justification for its decision that would be difficult for non-experts to evaluate. Well-established methodological best practices mitigate

⁹ *Id.* Sec. 3(d).

¹⁰ Executive Order 12866, 58 Fed. Reg. 51735 (1993).

¹¹ *Id.* Sec 1(b)(6).

¹² President George W. Bush made only minor changes to the Clinton Order at the end of his term. *See* Executive Order 13422, 72 Fed. Reg. 2763 (2007). President Obama’s executive order on regulatory review explicitly adopts the framework of the Clinton order. *See* Executive Order 13563, 76 Fed. Reg. 3821, 3821 (2011). The Trump administration purports to operate under Executive Order 12866 as well. *See* Memorandum from Dominic J. Mancini, Acting Administrator, Office of Information and Regulatory Affairs to Regulatory Policy Officers at Executive Departments and Agencies and Managing and Executive Directors of Certain Agencies and Commissions, Subject: Guidance Implementing Executive Order 13771, Titled “Reducing Regulation and Controlling Regulatory Costs” (April 5, 2017).

¹³ There is uncertainty associated with estimates of both costs and benefits and agencies often make conservative assumptions in light of that uncertainty.

¹⁴ Office of Management and Budget, Circular A-4: Regulatory Analysis (2003).

¹⁵ EPA, Guidelines for Preparing Economic Analyses (2010).

this threat by creating a relatively clear standard that can be used to hold agencies accountable: if an agency departs from established methods, it raises a red flag alerting the public and oversight officials to the possibility of manipulation. The larger the departure from established practice, the stronger the reason the agency should be able to provide.

Over its many years of use, cost-benefit analysis has been used to evaluate and improve a host of regulatory decisions, including at EPA. That agency, especially, has made substantial investments to improve its capacity to carry out cost-benefit analysis of environmental regulations, and the professional career staff at the agency has considerable experience with and expertise for this demanding task.

The Appropriate-and-Necessary Determination and MATS Rule

Regulation of HAPs under the Clean Air Act has a long and somewhat tortured history. The original version of the relevant statutory provision—§112—led to an ineffective regulatory scheme with only a handful of pollutants listed. These disappointing results led Congress to revisit HAPs in the 1990 Clean Air Amendments and adopt the current version of §112. The basic structure of the contemporary §112 process begins with a list of HAPs and then requires EPA to publish a list of categories of sources that emit HAPs in significant quantities.¹⁶ EPA must then set emissions standards for those categories.¹⁷

Section 112(n), however, creates a special process for EGUs. Under the special process, EPA must first study the public health hazards of HAP emissions from EGU, and then proceed with regulation only upon a finding that “such regulation is appropriate and necessary after considering the results of the study.”¹⁸

This special process has led to its own lengthy regulatory history. In 2000, the Clinton-era EPA found, on the basis of its public health study, that it was appropriate and necessary to regulate HAP emissions from EGUs because those emissions “present[] significant hazards to public health and the environment.”¹⁹ Later, the George W. Bush administration attempted to substitute an alternative cap-and-trade regulatory approach under §111(d) of the Act for the technology-based approach of §112, and in its Clean Air Mercury Rule (“CAMR”) purported to remove EGUs from the §112 list. This decision was ultimately invalidated by the D.C. Circuit.²⁰

Under President Obama, EPA returned to the question of HAP emissions from EGUs. After conducting an extensive review of the public-health science on the effects of HAP emissions, the agency again made an appropriate-and-necessary determination and, accordingly, issued the MATS Rule setting emissions standards.²¹ Although the finding and emissions standards were initially upheld by the D.C. Circuit,²² the Supreme Court subsequently remanded the appropriate-and-necessary finding in *Michigan v. EPA* on the grounds that EPA failed to consider costs before making it.²³

¹⁶ 42 U.S.C. § 7412(c)(1). Major sources are those that emit or have the potential to emit at least 10 tons per year of any HAP or at least 25 tons per year of any combination of HAPs. *Id.* § 7412(a)(1). Area sources are all other stationary sources of HAPs. *Id.* § 7412(a)(2).

¹⁷ *Id.* § 7412(d)(1).

¹⁸ *Id.* § 7412(n).

¹⁹ Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units, 65 Fed. Reg. 79,825, 79,826–30 (2000).

²⁰ *New Jersey v. EPA*, 517 F.3d 574, 579 (D.C. Cir. 2008).

²¹ National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9303 (Feb. 16, 2012).

²² *White Stallion Energy Ctr., LLC*, 748 F.3d 1222 (D.C. Cir. 2014).

²³ *Michigan v. EPA*, 135 S. Ct. 2699 (2015). The agency had conducted a Regulatory Impact Analysis of the MATS Rule, not the appropriate-and-necessary finding.

In response to the Court's ruling, EPA reassessed its appropriate-and-necessary finding in 2016 ("2016 Finding"). Taking costs into account—as required by the holding in *Michigan v. EPA*—the agency decided to reaffirm its prior decision.²⁴ The 2016 Finding examined the costs of regulating EGUs under §112 according to an overall reasonableness standard based on compliance costs relative to the size of the industry, as well as based on the cost-benefit information contained in the Regulatory Impact Analysis of the MATS Rule. As noted above, that analysis projected that the MATS Rule would impose \$9.6 billion per year in compliance costs but yield between \$37 billion and \$90 billion per year in quantifiable benefits, in addition to many other positive health and environmental effects that were not quantified.

The largest category of quantified benefits from the MATS Rule arises from the reduction of mortality risk. EPA anticipated that between 4,200 and 11,000 premature deaths would be avoided per year. Other anticipated health benefits of the rulemaking included fewer nonfatal heart attacks and hospitalizations for respiratory and cardiovascular disease as well as reductions in the incidence of a range of harmful neurological conditions, including IQ loss and developmental delays. In addition, there were considerable environmental benefits, including reductions in damage to ecosystems, enhanced visibility, and improvements in recreational and commercial fishing, agricultural yields, and forest productivity. The costs anticipated from the rulemaking were primarily associated with capital upgrades to pollution control technology.

The 2016 Finding is now being revisited by the Trump administration in the Proposal.

Indirect Costs and Benefits

In the preamble to the MATS Rule, EPA noted that the "great majority" of the quantified benefits of the rule were "attributable to co-benefits from reductions in [particulate matter]-related mortality."²⁵ In the 2016 Finding, the agency explained the relationship between the HAP emissions regulation and particulate matter as follows:

[I]ninstalling control technologies and implementing the compliance strategies necessary to reduce the HAP emissions directly regulated by the MATS rule also results in concomitant (co-benefit) reductions in the emissions of other pollutants such as directly emitted [particulate matter (PM_{2.5})] and [sulfur dioxide (SO₂)]. While reductions of PM_{2.5} and SO₂ are not the objective of the MATS rule, these emission reductions are a direct consequence of regulating the HAP emissions from EGUs.²⁶

There is nothing unusual about indirect costs and benefits, which are a normal and anticipated element of regulating in a complex world. In an influential book published two decades ago that helped call attention to the importance of indirect regulatory effects, John D. Graham (who went on to serve as OIRA Administrator under George W. Bush) and Jonathan B. Wiener collect dozens of examples to make that point that inefficient regulations can result from ignoring indirect effects.²⁷ Given the nature of the problems that regulators often face, and the complex economic, behavioral, environmental, and biological systems involved, it is hardly surprising that the consequences of major government actions would flow beyond the narrow confines of direct effects. Rather, a reasonable regulator should acknowledge and attempt to anticipate a cascade of possible effects, as both people and environmental systems respond and adapt to direct regulatory effects.

In recognition of their importance, indirect effects are explicitly mentioned in the relevant guidance documents, which expressly call regulators' attention to this class of regulatory consequences. The Circular A-

²⁴ Supplemental Finding That It Is Appropriate and Necessary to Regulate Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units, 81 Fed. Reg. 24,420 (Apr. 25, 2016).

²⁵ 77 Fed. Reg. at 9305-06.

²⁶ 81 Fed. Reg. at 24,438.

²⁷ John D. Graham and Jonathan B. Wiener, *Risk v. Risk: Tradeoffs in Protecting Health and the Environment* (Harvard University Press, 1997).

4 guidance document states, “[t]he same standards of information and analysis quality that apply to direct benefits and costs should be applied to ancillary benefits and countervailing risks.”²⁸ EPA’s Guidelines for Preparing Economic Analyses likewise explicitly direct the agency to consider “ancillary benefits and costs.”²⁹

The need to analyze indirect costs and benefits flows naturally from the purpose of cost-benefit analysis.³⁰ If the goal is to anticipate and evaluate the consequences of a regulatory decision, there is no reason to make a distinction between direct and indirect effects: they are both equally real to the people who are affected by them. Indeed, the primary value of the concept of indirect regulatory effects is to call agencies’ attention to this class of consequences—to expand the scope of agency analyses so that they are more comprehensive. As noted by Graham and Weiner, Circular A-4, and EPA’s Guidelines, problems arise when agencies’ focus is too narrow, not too wide. In instances where agencies have failed to heed the relevant guidance and insisted on departing from standard practice by ignoring indirect regulatory effects, courts have found their decisions to be irrational.³¹

In keeping with the relevant guidance and case law, agencies often consider the indirect effects of their regulatory decisions. Considering only EPA, indirect benefits, and Clean Air Act regulations, examples abound:

- Reagan administration: regulation of toxic emissions from municipal waste combustors took into account co-benefit reductions of criteria pollutants.³²
- George H. W. Bush administration: performance standards for landfill gases took into account co-benefits of reduced global loadings of methane.³³
- Clinton administration: HAP standards from pulp and paper producers took into account co-benefit reductions in volatile organic compounds, particulate matter, and carbon monoxide.³⁴
- George W. Bush administration: Clean Air Interstate Rule to control particulate matter and ozone took into account co-benefit reductions in mercury emissions.³⁵
- Obama administration: HAP standards for combustion engines generates indirect benefits from carbon monoxide, volatile organic compounds, and nitrogen oxides.³⁶

²⁸ Circular A-4 at 26

²⁹ EPA, Guidelines at 11-2. Earlier version of the Guidelines also directs the agency to consider indirect costs and benefits. See Kimberly M. Castle and Richard L. Revesz, Environmental Standards, “Thresholds, and the Next Battleground of Climate Change Regulations,” 103 *Minnesota Law Review* 1349, 1428–29 (2019).

³⁰ Strengthening Regulatory Review: Recommendations For The Trump Administration From Former OIRA Leaders 6 (2016) (“[T]he goal of cost-benefit analysis is to maximize net benefits for society, which requires . . . consideration of all reasonable regulatory alternatives and all significant social welfare effects, including any indirect or difficult-to-quantify costs or benefits.”).

³¹ See e.g. *Competitive Enter. Inst. v. Nat’l Highway Traffic Safety Admin.*, 856 F.2d 321, 326–27 (D.C. Cir. 1992) (striking down a National Highway Traffic Safety Administration fuel-efficiency rule for failing to consider indirect costs in the form of vehicle safety risks); *Corrosion Proof Fittings v. EPA*, 947 F.2d 1201, 1225 (5th Cir. 1991) (remanding ban asbestos-containing brakes under the Toxic Substances Control Act for failure to consider the indirect safety harm that would accompany forcing cars to use substitute, non-asbestos brakes).

³² See 52 Fed. Reg. 25,399, 25,406 (July 7, 1987).

³³ 56 Fed. Reg. 24,468, 24,469 (May 30, 1991).

³⁴ See 63 Fed. Reg. 18,504, 18,585–86 (Apr. 15, 1998).

³⁵ See 70 Fed. Reg. 25,162, 25,170 (May 12, 2005). See EPA, Regulatory Impact Analysis for the Final Clean Air Interstate Rule, at 1-10 (2005).

³⁶ 75 Fed. Reg. 51,570, 51,578 (Aug. 20, 2010).

Collectively, economic theory, the relevant guidance documents, decades of bipartisan agency practice, and simple common sense all indicate that agencies should consider indirect costs and benefits when making regulatory decisions. Departing from this well-established norm requires a very good reason.

Extraordinary and Unjustified Departure from Established Practice

In the Proposal, EPA proposes to reverse the 2016 Finding.³⁷ In doing so, it functionally ignores the substantial quantified benefits of the MATS Rule on the grounds that they are not direct benefits. EPA suggests that focusing “primarily” on HAP benefits—as opposed to particulate matter co-benefits—may be the “only permissible approach” under §112(n).³⁸ Alternatively, EPA argues that its decision not to consider co-benefits is a “reasonable approach . . . to considering costs in response to *Michigan*.”³⁹ On either grounds, the agency puts aside the overwhelming evidence that the MATS Rule generates massive net benefits and instead “proposes to conclude that it is not appropriate and necessary to regulate HAP from EGUs . . . because the costs of such regulation grossly outweigh the HAP benefits.”⁴⁰

As discussed above, guidance documents and prior practices provide a baseline against which the analytic choices of agencies in individual rulemakings can be judged. Where an agency’s methods depart from the standard practice, it raises a legitimate concern that cost-benefit analysis is being manipulated to justify a regulatory decision based on political expediency or other grounds. The larger the departure, the greater the burden on the agency to provide a reasoned explanation for its unusual course of action.

In the Proposal, EPA’s reasoning entirely fails to justify the extraordinary step of functionally ignoring many billions of dollars’ worth of regulatory benefits.

First, there is nothing in the language of §112(n) that indicates that the agency should limit the terms of its analysis to direct effects. The provision simply states that the Administrator is to “regulate electric utility steam generating units under [§112], if the Administrator finds such regulation is appropriate and necessary after considering the results of the study required by this subparagraph.”⁴¹ If Congress had intended the agency to limit its analysis to direct regulatory effect, it could simply have said so. It did not, and it did not do so in the face of an already substantial practice by agencies of considering indirect costs and benefits. It borders on outlandish to construe statutory silence in this context to prohibit consideration of indirect effect. Even the claim that statutory silence *permits* the agency to ignore indirect effects is highly implausible.

In addition, the Court’s guidance in *Michigan v. EPA* on the appropriate interpretation of §112(n) runs entirely counter to EPA’s approach in the Proposal. According to the Court, “‘appropriate’ is ‘the classic broad and all-encompassing term that naturally and traditionally includes consideration of all the relevant factors.’”⁴² The Court also recognized the relevance of “‘established administrative practice’”—which includes many decades of considering indirect costs and benefits—to interpreting the phrase “‘appropriate and necessary’” in §112(n).⁴³ The Court characterized the agency practice as follows: “reasonable regulation ordinarily requires paying attention to the advantages and the disadvantages of agency decisions.”⁴⁴ There is no hint that the

³⁷ 84 Fed. Reg. at 2674.

³⁸ *Id.* at 2676.

³⁹ *Id.* at 2674–76.

⁴⁰ *Id.*

⁴¹ 42 U.S.C. § 7412(n)(1)(A).

⁴² 135 S. Ct. at 2707 (emphasis added) (quoting *White Stallion Energy Ctr., LLC*, 748 F.3d at 1266 (Kavanaugh, J., dissenting)).

⁴³ 135 S. Ct. at 2708.

⁴⁴ *Id.* at 2707 (emphasis omitted).

“advantages” and “disadvantages” discussed by the Court are limited to only the *direct* advantages or disadvantages.⁴⁵

The agency’s argument from statutory structure is also extremely weak and, indeed, is very similar to the argument offered by the agency in *Michigan v. EPA* that was rejected by the Court. The claim is that since the statute directs the agency to conduct a study of the public health effects of HAP emissions prior to regulating, the agency should accordingly exclude co-benefits from its appropriate-and-necessary analysis. In *Michigan v. EPA*, the Court heard a similar argument that the agency should not consider costs in making the appropriate-and-necessary finding because the study mandated by §112(n)(1)(A) focuses exclusively on public health and does not mention costs.⁴⁶ The primary holding of *Michigan v. EPA* was to reject EPA’s argument in favor of an expansive interpretation of §112(n) that required the agency to examine the whole range of consequences from regulating HAPs, not merely HAP-related public health effects.

The Court does mention co-benefits in *Michigan v. EPA*, but only to expressly decline to address the issue of whether and how co-benefits should be weighed against costs.⁴⁷ The Proposal’s claim that *Michigan v. EPA* prohibits consideration of co-benefits is flatly contradicted by the majority opinion, which made it absolutely clear that it did not decide the question of how co-benefits should be treated. Where courts *have* addressed the issue of co-benefits under §112, they have found that it is entirely appropriate for such benefits to be considered.⁴⁸

The agency argues in the alternative that it is a reasonable exercise of its discretion to functionally ignore co-benefits when making the appropriate-and-necessary determination. It should be clear from the discussion above that this choice is anything but reasonable: it has no basis in economic theory and contradicts the relevant guidance and decades of agency practice. More to the point, it flouts basic principles of rationality to claim that a rule is not cost-benefit justified when it will, in fact, generate tens of billions of dollars of net benefits every year. If cost-benefit analysis as a tool for evaluating regulatory policy is to mean anything, then the MATS Rule must pass with flying colors.

Further exacerbating the irrationality of the agency’s decision to functionally ignore indirect benefits is that it *counts indirect costs*. The cost estimate in the 2016 Finding, which the agency does not revisit in the Proposal, includes costs “beyond the costs borne by owners of coal- and oil-fired units regulated by MATS.”⁴⁹ This is the definition of indirect costs.⁵⁰ The irrationality of accounting for indirect costs while ignoring indirect

⁴⁵ Indeed the Court emphasizes the importance of indirect costs:

In addition, “cost” includes more than the expense of complying with regulations; any disadvantage could be termed a cost. EPA’s interpretation precludes the Agency from considering any type of cost—including, for instance, harms that regulation might do to human health or the environment. The Government concedes that if the Agency were to find that emissions from power plants do damage to human health, but that the technologies needed to eliminate these emissions do even more damage to human health, it would still deem regulation appropriate. No regulation is “appropriate” if it does significantly more harm than good.

135 S. Ct. at 2707 (citations omitted).

⁴⁶ *Id.* at 2708.

⁴⁷ *Id.* at 2711–12.

⁴⁸ *U.S. Sugar Corp. v. EPA*, 830 F.3d 579, 625–26 (D.C. Cir. 2016) (reviewing standard setting for hydrogen chloride emissions from boilers; “text [of §112(d)(4)] does not foreclose the Agency from considering co-benefits”; considering such benefits “is consistent with the [Clean Air Act]’s purpose—to reduce the health and environmental impacts of hazardous air pollutants”).

⁴⁹ 81 Fed. Reg. at 24,440.

⁵⁰ Direct costs are “those costs that fall directly on regulated entities as the result of the imposition of a regulation.” EPA, Guidelines for Preparing Economic Analyses 8-7 (2010). Indirect costs, meanwhile, are “those incurred in related markets or experienced by consumers or government agencies not under the direct scope of the regulation.” *Id.* at 8-7 to 8-8.

benefits should be obvious.⁵¹ This contradiction arises in part because the terms “benefits” and “costs” are in fact merely labels of convenience, and agencies sometimes also refer to benefits as “negative costs.”⁵² Failing to account for indirect benefits is, by definition, the failure to account for indirect negative costs. The agency provides no reason why some indirect costs are accounted for and not others.

Where agencies have engaged in similar behavior in the past by “put[ting] a thumb on the scale by undervaluing the benefits and overvaluing the costs,”⁵³ or “inconsistently and opportunistically framing” a rule’s advantages and disadvantages,⁵⁴ courts have rejected this clear violation of norms of rationality. The Proposal departs from decades of practice, relevant guidance, and common sense. EPA provides no reason to believe that Congress intended the agency to do so: if anything, the language of §112 and relevant judicial interpretation indicate that EPA cannot lawfully ignore a massive category of regulatory effects.

Unquantified Benefits

Compounding the agency’s failure to count indirect benefits, the Proposal also does not adequately address the substantial benefits generated by the MATS Rule that were discussed in a quantitative fashion in the 2016 Finding. In light of its decision to functionally disregard the co-benefits of the rule, the agency was obligated to undertake the additional analysis of this class of benefits needed to inform its final judgment that regulating HAPs from EGUs was not cost-benefit justified. The mere fact that the 2016 Finding did not quantify these regulatory benefits is not a permissible reason to conclude that they are not sufficient to justify regulation on their own terms.

In the 2016 Finding, the agency reported the strong scientific basis for its finding that there were substantial benefits associated with the reduction of HAP emissions from EGUs that it left unquantified. Unquantified costs and benefits are a standard part of cost-benefit analysis, and both Executive Order 12291 and Executive Order 12866 are quite clear that both quantified and unquantified effects should be considered by agencies when making regulatory decisions. Whether or not a regulatory effect is amenable to quantification in a particular context has no bearing on the reality or importance of those effects.

The quantified estimate of costs and benefits relied on in the 2016 Finding was more than sufficient to support the conclusion that the appropriate-and-necessary finding was cost-benefit justified. Additional quantification of regulatory benefits would simply have provided additional evidence that the MATS Rule, which was cost-benefit justified many times over, was even more cost-benefit justified.

In engaging in a reappraisal of the appropriate-and-necessary determination in the context of its decision to functionally ignore indirect benefits, the agency finds itself in a different situation. Without substantial additional analysis, it is not clear whether the benefits that were left unquantified in the context of the 2016 Finding are sufficient to justify the costs. To make that determination, the agency would have to engage in a good faith effort either to engage in additional quantification or to find that it was not possible to do so and then appropriately weigh the unquantified benefits against the costs of the rule. In the Proposal, the agency does neither.

⁵¹ “It is difficult to imagine a more arbitrary and capricious methodology than a rule under which EPA must take into account the indirect consequences of regulation if they are negative but must ignore them if they are positive.” Natalie Jacewicz and Richard L. Revesz, “EPA is rolling back protections with methodology no respectable economist would endorse,” *The Hill.com* (March 4, 2019). There are “no legal, political, or intellectual . . . impediments to treating ancillary benefits and countervailing risks equally in cost-benefit analysis.” Christopher C. DeMuth & Douglas H. Ginsburg, “Rationalism in Regulation,” 108 *Michigan Law Review* 877, 888 (2010). Indirect benefits “are simply mirror images” of indirect costs. Samuel J. Rascoff & Richard L. Revesz, “The Biases of Risk Tradeoff Analysis: Towards Parity in Environmental and Health-and-Safety Regulation,” 69 *University of Chicago Law Review* 1763, 1793 (2002).

⁵² EPA, Draft Regulatory Impact Analysis: Proposed Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, at xii (2009).

⁵³ *Ctr. for Biological Diversity v. Nat’l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1198 (9th Cir. 2008).

⁵⁴ *Bus. Roundtable v. SEC*, 647 F.3d 1144, 1148–49 (D.C. Cir. 2011).

Treatment of Costs

A final glaring failure in the Proposal is the treatment of the costs of regulating HAPs from EGUs. First, analysis of the actual costs of complying with the MATS Rule have shown them to be considerably lower than estimated in 2012.⁵⁵ To the extent that the Proposal is intended to include a retrospective analysis of the appropriate-and-necessary finding, it must engage in additional analysis to determine the actual compliance costs of the rule.

More important, the Proposal fails to account for the fact that many of the total costs of complying with the MATS Rule have already been incurred, and so even if reversing the appropriate-and-necessary designation led to the MATS Rule being invalidated, that outcome would provide very little economic benefit to affected industry. To make an accurate determination whether, *at this time*, it is appropriate and necessary to regulate HAP emissions from EGUs, the agency should consider only the *additional* costs associated with regulation going forward and compare those costs to the benefits of the regulation. By treating capital investments as though they were reversible, EPA analyzes the costs and benefits of turning back time to undo the 2012 MATS Rule, which is impossible.

Conclusion

I am grateful for the opportunity to testify today, and I would be happy to answer whatever questions you have.

⁵⁵ M.J. Bradley & Associates, LCC, Status of the MATS Rule (MJB&A Issue Brief, Nov. 16, 2017).

Ms. DEGETTE. Thank you so much.
 Dr. Selin, you are now recognized for 5 minutes.

STATEMENT OF NOELLE ECKLEY SELIN

Dr. SELIN. Thank you, Chair DeGette, Ranking Member Guthrie for this opportunity to speak.

I would like to share some of the latest developments and scientific understanding of where mercury comes from, how it travels in the environment, and how it ultimately affects human health.

Mercury is emitted to the air by human activities, such as burning coal, a major source of mercury pollution. Once it's in the air, mercury undergoes chemical changes and can deposit both nearby and far away from sources, depending on its chemical form. After depositing to water bodies, mercury can be converted to methyl mercury, which is a potent neurotoxin. This form of mercury accumulates up food chains, and people in the United States are exposed to methyl mercury primarily by eating fish and shellfish.

Scientific knowledge about mercury has advanced significantly since the mercury and air toxic standards were developed. My own research has focused on understanding and quantifying the effects of reductions in mercury emissions. That requires understanding where mercury is emitted, where it travels, where it's deposited and in what quantities, and how that mercury could affect human health.

One such analysis we did is particularly relevant to the MATS standard. In a paper published in early 2016 in the peer-reviewed journal *Proceedings of the National Academy of Sciences*, we quantified the direct mercury-related benefits to the U.S. of domestic and international mercury reductions. We calculated the expected changes in exposure to methyl mercury and quantified the expected impacts from the MATS standard compared to the impacts that would occur without the standard.

Our best estimate is that the monetized mercury-related benefits of MATS will amount to \$3.7 billion per year. The original regulatory impact analysis EPA performed for the MATS rule in 2011 quantified only a subset of those benefits and valued that subset at approximately \$4 million to \$6 million, a thousand times less.

Our estimates are larger for two key reasons. First, we looked at the entire U.S. population while EPA considered only people who consumed fish they catch for themselves in fresh water. Recent work has shown that more than 80 percent of methyl mercury exposure to the U.S. population comes from saltwater fish, most of which is from the commercial market.

Second, we included both the impacts of mercury on reduced IQ in newborns as well as cardiovascular impacts for all adults, while EPA looked solely at the reduction of IQ. An EPA-convened expert panel concluded in 2011 that scientific evidence from mercury's cardiovascular effects was strong enough to include those effects in estimating benefits of regulations.

Because of these two factors, our 2016 estimates are a more comprehensive assessment of the benefits of MATS than EPA's in 2011. Yet the latest science indicates that even our work may be an underestimate for several reasons. First, we now know that mercury can have other health impacts in addition to those we as-

sessed. Methyl mercury can have neurobehavioral effects beyond IQ declines as well as impacts on the immune system and reproductive system. These effects are harder to quantify in dollar terms, but scientific evidence that they're occurring continues to grow. Including these impacts would obviously increase the cost of mercury emissions and the benefits of reducing them.

Second, our main estimates also do not take into account how long mercury lasts in the environment. Mercury is an element. So it doesn't go away. Mercury that we emit today circulates in the environment for decades and even centuries. This mercury can accumulate in the soil and below the surface in the ocean and return to the atmosphere. It then deposits again, converts to methyl mercury, and affects the health of future fish consumers as well. We estimated that taking into account these impacts would make our estimates about 30 percent larger.

Third, our aggregate numbers for the entire U.S. population obscure the fact that the burdens of mercury pollution can fall disproportionately on some sensitive populations. These include those living near large emission sources such as coal-fired power plants and those for whom eating freshwater fish is important for subsistence, recreational, or cultural reasons, including Native Americans.

Finally, our estimates only address the direct benefits of mercury reductions. The benefits of the role for reducing air pollution from particulate matter are substantial as well. And these were also quantified by EPA. For regulatory analysis to be accurate, it's important to take into account all potential consequences of regulations, intended or not, both positive and negative.

In summary, the number of studies on mercury has been increasing during the nearly two decades I have been working on mercury science. And the best available science now indicates that the impacts of mercury are far larger than previously estimated. EPA needs to take into account the latest science on mercury as it makes its decisions.

Thank you.

[The prepared statement of Dr. Selin follows:]

Written testimony: Noelle Eckley Selin, Associate Professor, Institute for Data, Systems, and Society and Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology

I am Noelle Eckley Selin, Associate Professor in the Institute for Data, Systems, and Society, and in the Department of Earth, Atmospheric and Planetary Sciences at the Massachusetts Institute of Technology. I am an atmospheric chemist who studies how mercury travels in the air, how it behaves in the environment, and how regulatory actions can alter mercury exposure and human impacts. My recent research, as well as that of other scientists, can and should inform the evaluation of the Mercury and Air Toxics Standards (MATS) issued by the Environmental Protection Agency (EPA).

My primary area of expertise is modeling of mercury in the atmosphere and its cycling through the environment. I have been studying mercury for more than 15 years, and I developed one of the models, the GEOS-Chem mercury model, that is commonly used to calculate how mercury travels through the air, land, and ocean (Selin et al., 2007; Selin et al., 2008). While mercury is a naturally occurring element, human activities over history have increased the amount of mercury that is depositing to global ecosystems by about a factor of three since the year 1450 (Outridge et al., 2018).

Burning coal is a major source of mercury emissions into the atmosphere, both in the United States and globally. Once emitted, mercury travels through the air, changes chemical form, and can deposit both nearby and far away from sources, depending on its form. In water bodies, mercury can then be converted to the more toxic methylmercury, which accumulates via food chains. People in the U.S. are exposed to mercury primarily by eating fish, including both freshwater and marine (saltwater) fish.

Because of the continuing health and environmental risks posed by mercury emissions both here in the U.S. and worldwide, my research group has worked to better understand how regulations on mercury emissions can translate into changes in concentrations in the environment, human exposure, and health impacts. Recent policy efforts to reduce mercury emissions include the domestic Mercury and Air Toxics Standards issued in 2011 as well as the global Minamata Convention on Mercury, which entered into force in 2017 and to which the U.S. is a party.

Since the MATS standards were announced in 2011, we have been analyzing their potential benefits. In 2011, when the Environmental Protection Agency proposed the MATS rule, its Regulatory Impact Analysis did not fully assess the benefits of reducing mercury emissions for the entire U.S. population. The original proposal acknowledged that the agency had limited ability to undertake this quantification with the scientific methodologies and tools available at the time. EPA thus conducted a partial analysis of mercury benefits, quantifying benefits only for people who consume self-caught freshwater fish (recreational fishers and their families), and only for a subset of applicable health benefits (reduced IQ deficits). EPA calculated that these (partial) benefits amounted to \$4-6 million per year.

My research group developed a new approach which enabled us to conduct a much more comprehensive analysis of the mercury-related benefits of MATS. To do this, we used emissions scenarios in which U.S. mercury emissions were reduced consistent with the requirements under MATS. We used a state-of-the-art atmospheric model to calculate the resultant change in mercury deposition in the U.S., and in the ocean. We used that information, along with data on current mercury intake and concentrations in the U.S. population, to calculate expected changes in exposure to methylmercury, the toxic form of mercury that people are exposed to by eating fish. We then used the best available information on the health impacts of mercury, including both IQ deficits and cardiovascular impacts (heart attacks), and, using a variety of economic techniques, quantified the expected impacts from the MATS standard relative to a case without these policies.

With this method, we were able to calculate the benefits of the MATS standards to the entire US population, rather than just looking at those who consume self-caught freshwater fish. (Giang and Selin 2016).

Our research found that when we considered a more complete subset of health impacts (IQ and heart attacks) and affected populations (consumers of self-caught freshwater fish and consumers of commercial marine and estuarine fish in the US market), the benefits of MATS turn out to be orders of magnitude larger than those estimated by EPA. Our best estimate was that MATS could yield cumulative lifetime benefits for individuals affected by 2050 of \$147 billion (2005 USD, discounted at 3%). As we simulated these benefits over a 40-year period (2010-2050), this is equivalent to an average annual benefit of **\$3.7 billion**.

Our estimates are much higher than EPA's for two key reasons.

- 1) Unlike EPA, we examined the impacts on the entire U.S. population, recognizing that people in the US eat both freshwater and saltwater fish, and fish caught both recreationally and commercially. Indeed, recent work has shown that more than 80% of methylmercury exposure to the US population comes from marine fish (Sunderland et al., 2018).
- 2) We included not only IQ deficits for newborn children, which was the only endpoint quantified by EPA, but also fatal and non-fatal heart attacks for adults, following the best available science identifying and quantifying the impacts of mercury. An expert panel convened by EPA concluded that scientific evidence of an effect was strong enough to incorporate these impacts into regulatory assessments (Roman et al. 2011).

Furthermore, our estimates do not capture all the possible impacts of MATS. In particular, there are four other important aspects of mercury emissions that should be taken into account:

- 1) **Other health impacts:** New research over the past several years has quantified impacts other than IQ decreases and heart attacks. Mercury can damage the immune system and reproductive system, and is a possible carcinogen. These effects are not yet easily quantifiable, but scientific evidence that they are occurring continues to grow.

- 2) **Duration:** The main estimates in our 2016 paper also do not fully take into account the long time frame that mercury lasts in the environment. As an element, mercury does not degrade, so mercury that we emit today continues to cycle in the environment for decades and even centuries (Selin, 2009; Obrist et al., 2018). Mercury can accumulate in the soil and below the surface in the ocean, and can return to the atmosphere to affect people in the future, just as mercury emitted in the past continues to affect us today. This re-emitted mercury can then deposit to waterbodies and become methylmercury, continuing to affect human health. The mercury model we used in our 2016 paper did not simulate its long-term impacts; simulating these requires tracking mercury for decades or more as it moves through the land and ocean. We did, however, estimate how our result would change given these effects, and found they would increase our overall estimates by about 30%. Our ability to quantify the long-term impacts of mercury in models has improved since 2016 (Selin, 2018, Angot et al., 2018). Taking this into account, we found in subsequent work that delaying the implementation of global mercury reductions by five years would decrease the impact of policies by an average of 14%. In other words, a reduction in mercury delayed by 5 years would have to be 14% more stringent in order to have the same effect, due to the continuing impacts from mercury emitted during the delay and subsequently re-emitting to the atmosphere (Angot et al., 2018).
- 3) **Highly Exposed Populations:** Some population groups in the U.S. are especially exposed to mercury, particularly subsistence fishers and tribal communities (Perlinger et al., 2018; Angot et al., 2018).
- 4) **Additional benefits:** Our estimates only address the direct benefits of mercury reductions. The benefits of the rule from reducing air pollution from particulate matter are likely to be substantial as well, and these were also quantified by EPA. In related research, my group has quantified particulate matter benefits for a number of different policy proposals other than MATS. For example, for several policies aimed at reducing carbon dioxide, we found that particulate matter related benefits can exceed the cost of regulations (e.g. Thompson et al., 2014). For impact and cost-benefit analysis to be accurate, it is important to take into account all of the potential consequences of regulations, intended or not, both positive and negative.

In 2016, EPA issued its “Supplemental Finding That It Is Appropriate and Necessary To Regulate Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units.” The EPA recently proposed to reconsider this supplemental finding, and to determine that it is not “appropriate and necessary” to regulate mercury emissions from power plants under Section 112 of the Clean Air Act. In support of its revised finding, EPA asserted that the monetized benefits of the rule are in the range of \$4-6 million. As summarized above, this estimate is not consistent with the best available science.

In 2016, I submitted a public comment on the proposed supplemental finding, together with other mercury researchers who were then part of my research team at MIT.¹ In that comment, we provided scientific evidence that supported EPA's determination that (1) formal, monetized benefit-cost analysis is not the preferred approach for weighing the advantages and disadvantages of mercury policy, and (2) even if a formal benefit-cost analysis approach is used to evaluate MATS, benefits related to mercury alone are substantial and likely to outweigh its costs. In support of (1), we noted in our comment that benefits to human health that are difficult to quantify in regulatory benefit-cost analysis may be large, and that aggregating benefits for the entire US can obscure the fact that some communities bear significantly more burdens than others. Relevant to (2), we provided information on our 2016 analysis estimating \$3.7 billion/year in lifetime benefits of MATS.

I also submitted two additional public comments in 2019, along with other researchers, urging EPA to incorporate the most up-to-date scientific information in its consideration of its "appropriate and necessary" finding. Together with mercury researchers at Harvard University and across the country, we emphasized that the scientific literature has developed significant new evidence since 2011 quantifying the benefits of regulating power plant emissions.² In another comment, with coauthors of studies estimating the impacts of regulations on mercury deposition and exposure, we reiterated our argument that MATS benefits are substantial and likely to outweigh costs, and presented recent research that emphasized its differential impacts on sensitive populations such as tribal communities (Angot et al., 2018; Perlinger et al., 2018).³

In conclusion, the assertion by EPA that the MATS standards result in \$4-6 million in mercury-related benefits to the U.S. is out of date and incorrect. The best available scientific information suggests that the mercury-related benefits that can be quantified are orders of magnitude more than that – in the billions of dollars. Unquantified benefits, as well as the benefits from reducing particulate matter, would make that number even higher. EPA ought to take into account the best available scientific evidence in developing its regulations. Mercury continues to pose risks to the U.S. population, and it remains appropriate and necessary to regulate its emission.

Attachment:

Giang, A. and Selin, N.E., 2016. Benefits of mercury controls for the United States. *Proceedings of the National Academy of Sciences*, 113(2), pp.286-291.

References:

Angot, H., Hoffman, N., Giang, A., Thackray, C.P., Hendricks, A.N., Urban, N.R. and Selin, N.E., 2018. Global and Local Impacts of Delayed Mercury Mitigation Efforts. *Environmental Science & Technology*, 52(22), pp.12968-12977.

¹ <https://www.regulations.gov/document?D=EPA-HQ-OAR-2009-0234-20544>

² <http://clinics.law.harvard.edu/environment/files/2019/04/EELPC-MATS-Cost-Reconsideration-Comments-FINAL.pdf>

³ http://web.mit.edu/selin/www/EPA-HQ-OAR-2018_0794_Giangetal.pdf

Giang, A. and Selin, N.E., 2016. Benefits of mercury controls for the United States. *Proceedings of the National Academy of Sciences*, 113(2), pp.286-291.

Obrist, D., Kirk, J.L., Zhang, L., Sunderland, E.M., Jiskra, M. and Selin, N.E., 2018. A review of global environmental mercury processes in response to human and natural perturbations: Changes of emissions, climate, and land use. *Ambio*, 47(2), pp.116-140.

Outridge, P.M., Mason, R.P., Wang, F., Guerrero, S. and Heimbürger-Boavida, L.E., 2018. Updated global and oceanic mercury budgets for the United Nations Global Mercury Assessment 2018. *Environmental Science & Technology*, 52(20), pp.11466-11477.

Perlinger, J.A., Urban, N.R., Giang, A., Selin, N.E., Hendricks, A.N., Zhang, H., Kumar, A., Wu, S., Gagnon, V.S., Gorman, H.S. and Norman, E.S., 2018. Responses of deposition and bioaccumulation in the Great Lakes region to policy and other large-scale drivers of mercury emissions. *Environmental Science: Processes & Impacts*, 20(1), pp.195-209.

Roman, H.A., Walsh, T.L., Coull, B.A., Dewailly, É., Guallar, E., Hattis, D., Mariën, K., Schwartz, J., Stern, A.H., Virtanen, J.K. and Rice, G., 2011. Evaluation of the cardiovascular effects of methylmercury exposures: current evidence supports development of a dose–response function for regulatory benefits analysis. *Environmental Health Perspectives*, 119(5), pp.607-614.

Selin, N.E., Jacob, D.J., Park, R.J., Yantosca, R.M., Strode, S., Jaeglé, L. and Jaffe, D., 2007. Chemical cycling and deposition of atmospheric mercury: Global constraints from observations. *Journal of Geophysical Research: Atmospheres*, 112(D2).

Selin, N.E., Jacob, D.J., Yantosca, R.M., Strode, S., Jaeglé, L. and Sunderland, E.M., 2008. Global 3-D land-ocean-atmosphere model for mercury: Present-day versus preindustrial cycles and anthropogenic enrichment factors for deposition. *Global Biogeochemical Cycles*, 22(2).

Selin, N.E., 2009. Global biogeochemical cycling of mercury: a review. *Annual Review of Environment and Resources*, 34, pp.43-63.

Selin, N.E., 2018. A proposed global metric to aid mercury pollution policy. *Science*, 360(6389), pp.607-609.

Sunderland, E.M., Li, M. and Bullard, K., 2018. Decadal changes in the edible supply of seafood and methylmercury exposure in the United States. *Environmental Health Perspectives*, 126(1), p.017006.

Attachment



Benefits of mercury controls for the United States

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Mercury pollution poses risks for both human and ecosystem health. As a consequence, controlling mercury pollution has become a policy goal on both global and national scales. We developed an assessment method linking global-scale atmospheric chemical transport modeling to regional-scale economic modeling to consistently evaluate the potential benefits to the United States of global (UN Minamata Convention on Mercury) and domestic [Mercury and Air Toxics Standards (MATS)] policies, framed as economic gains from avoiding mercury-related adverse health endpoints. This method attempts to trace the policies-to-impacts path while taking into account uncertainties and knowledge gaps with policy-appropriate bounding assumptions. We project that cumulative lifetime benefits from the Minamata Convention for individuals affected by 2050 are \$339 billion (2005 USD), with a range from \$1.4 billion to \$575 billion in our sensitivity scenarios. Cumulative economy-wide benefits to the United States, realized by 2050, are \$104 billion, with a range from \$6 million to \$171 billion. Projected Minamata benefits are more than twice those projected from the domestic policy. This relative benefit is robust to several uncertainties and variabilities, with the ratio of benefits (Minamata/MATS) ranging from ≈ 1.4 to 3. However, we find that for those consuming locally caught freshwater fish from the United States, rather than marine and estuarine fish from the global market, benefits are larger from US than global action, suggesting domestic policies are important for protecting these populations. Per megagram of prevented emissions, our domestic policy scenario results in US benefits about an order of magnitude higher than from our global scenario, further highlighting the importance of domestic action.

mercury | policy | impacts assessment | Minamata Convention | economic benefits

Toxic contamination from human activities is a global problem. Although some countries have regulated toxic substances such as heavy metals and persistent organic pollutants for several decades, chemical contamination has still been identified as a key planetary boundary at risk for exceedance in the context of global change (1). To address this challenge, existing global environmental treaties try to manage the entire life cycle of chemical contaminants (2). The newest of these is a global treaty on mercury, the Minamata Convention. In November 2013, the United States became the first country to fulfill the requirements necessary to become a party to the convention.

In the United States, analyses to support domestic environmental decision-making include socioeconomic valuations of impacts as part of the regulatory process. However, these evaluations can be both scientifically challenging and politically contentious, particularly given uncertainties and knowledge gaps (as noted in arguments in a recent case heard in the US Supreme Court, *Michigan v. Environmental Protection Agency*, 2015, addressing analysis of the costs and benefits of mercury regulation). These challenges are especially difficult for contaminants such as mercury, which cross temporal and spatial scales and have both domestic and global sources. The chain of analysis from policies, through emissions, to impacts involves a complex pathway, which for mercury includes industrial activities, atmospheric chemistry, deposition processes, bioaccumulation, and human exposure. Existing approaches have not fully combined information and knowledge from these disparate fields, and

substantial gaps exist in scientific understanding of the processes that mercury undergoes through long-range transport. Thus, it has historically been difficult to quantitatively estimate prospective domestic benefits from global environmental treaty-making in ways that can be compared with socioeconomic analyses designed to support domestic environmental decision-making. Here, we use an assessment approach that enables tracing this pathway, accounting for best-available scientific understanding and addressing uncertainties and knowledge gaps with policy-appropriate assumptions.

Mercury is a naturally occurring element, but human activities such as mining and coal combustion have mobilized additional amounts, enhancing the amount of mercury circulating in the atmosphere and surface oceans by a factor of three or more (3, 4). Mercury previously deposited to land and water can revitalize over decades to centuries. Thus, human activities have fundamentally altered the global biogeochemical cycle of mercury (5). Deposited mercury in aquatic systems can be converted to more toxic methylmercury (MeHg), which bioaccumulates. People are then exposed to MeHg by eating contaminated fish. Effects of MeHg exposure include IQ deficits in prenatally exposed children (6–8) and may include cardiovascular effects in adults (7, 9). Scientific uncertainty and variability are substantial throughout this pathway, including but not limited to atmospheric chemistry, deposition patterns, methylation processes, bioaccumulation and food web dynamics, dietary patterns of exposure, and dose-response relationships. Despite these uncertainties, scientific analyses have been conducted to support decision-making, and state-of-the-art models exist for many of these steps.

Some studies have previously traced the pathway from mercury emissions to human impacts. These studies are limited in how completely they have represented physical processes, and how they have accounted for knowledge gaps. First, many do not explicitly consider spatial transport through the environment on a global scale, and so do not explicitly link emissions to exposure changes (10–14). Timescales associated with bioaccumulation through ecosystems also are often not taken into account, making

Significance

Mercury is a globally transported pollutant with potent neurotoxic effects for both humans and wildlife. This study introduces an assessment method to estimate the potential human health-related economic benefits of global and domestic mercury control policies. It finds that for the US population as a whole, global mercury controls could lead to approximately twice the benefits of domestic action by 2050. This result is robust to several uncertainties and variabilities along the emissions-to-impacts path, although we find that those consuming locally caught freshwater fish in the United States could benefit more from domestic action.

Author contributions: A.G. and N.E.S. designed research; A.G. performed research; A.G. and N.E.S. analyzed data; and A.G. and N.E.S. wrote the paper.

The authors declare no conflict of interest.

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it difficult to evaluate how the timing of emissions changes affects benefits (15). Few studies have explicitly included more uncertain, but potentially important, health endpoints such as cardiovascular effects in their estimates (12, 16). For instance, the US Environmental Protection Agency (15) focused on only IQ-related MeHg effects in their analysis of the Mercury and Air Toxics Standards (MATS) in the United States. Finally, methods used for previous studies were not designed to highlight the relative importance of uncertainties throughout the policies-to-impacts path.

We explicitly incorporate uncertainty and sensitivity analysis for key steps along the policies-to-impacts pathway to assess the relative importance of policy-relevant uncertainties. We combine best available models to trace projected global mercury policy scenarios to their US impacts. We use atmospheric modeling to project the amount of mercury depositing to the US and global seafood source regions with and without global policy. We incorporate assessment of timescales associated with bioaccumulation through ecosystems. We then link atmospheric mercury models to economic valuation models, generating a representation of mercury impacts that takes into account environmental and human response timescales. We use this assessment approach to present what is, to our knowledge, a first assessment of potential US benefits, defined in economic terms, from the Minamata Convention. We explicitly compare benefits of global and US policies, using consistent methodology, and analyze the relative impacts of these policies on the US population. We first present results from a base case analysis of mercury policy to 2050, using our integrated model. We then present our sensitivity analyses, assessing the influence of uncertainties on our base case results.

Results and Discussion

Tracking the Policies-to-Impacts Pathway: Base Case. Globally, our emissions projections under the Minamata Convention will result in 2050 in emissions of $1,870 \text{ Mg} \cdot \text{y}^{-1}$, which is roughly equivalent to the present-day level, but $2,270 \text{ Mg} \cdot \text{y}^{-1}$ less than our no policy (NP) scenario (17). The largest sources of anthropogenic mercury emission are stationary coal combustion, artisanal and small-scale gold mining, and metals production (18). Under NP, emissions are projected to more than double, largely as a result of growth in coal use in Asia (19); thus, the main differences in policy and NP projections depend on assumptions about emission controls for coal (20). Air quality abatement technologies such as flue gas desulfurization can capture mercury as a cobenefit. For global emission projections under the Minamata Convention, which requires the application of best available technologies, taking into account technical and economic feasibility, we assume the application of flue gas desulfurization or similar technology outside of the United States (17, 19). In the United States, our policy scenario is based on MATS (currently under legal challenge), which was designed to control Hg emissions from power generation, with full implementation by 2016 (15). In the United States, emissions in 2005 were $\sim 90 \text{ Mg} \cdot \text{y}^{-1}$ (15). Under our MATS projection, we extend

the US Environmental Protection Agency projected trend from 2016 to 2020 (15, 21) linearly, resulting in 2050 US emissions of $46 \text{ Mg} \cdot \text{y}^{-1}$. Our NP case for the United States includes no further improvements in emissions control technology or policy, and thus results in an approximate doubling of 2005 emissions by 2050 (19). Benefits of the Minamata Convention to the United States are calculated as the difference between the global Minamata and NP scenarios, holding US emissions constant at the MATS scenario. Benefits of MATS to the US are calculated as the difference between the US NP and MATS scenarios, holding emissions in the rest of the world constant at the NP scenario.

Under our Minamata case, mercury deposition to the United States and to the global oceans are 19% and 57% less than under NP in 2050, respectively. Fig. 1 maps these deposition differences over the contiguous United States. We model the atmospheric transport and deposition of mercury using the global, 3D land-ocean-atmosphere mercury model GEOS-Chem v.9.02, at $4^\circ \times 5^\circ$ resolution globally and $0.5^\circ \times 0.667^\circ$ resolution over the United States (22–26). We use net total deposition as a measure of mercury ecosystem enrichment (27). *SI Appendix, Chemical transport modeling* gives additional details on the modeling approaches. For our MATS case, deposition to the United States is 20% less than under NP, and deposition to the global oceans is 6% less. Although the modeled avoided deposition over the entire United States is similar under MATS and Minamata, the distribution of these differences varies, as shown in Fig. 1. Avoided deposition under MATS is more highly concentrated in the Northeast, where there are significant coal-fired emission sources. In contrast, US deposition benefits under the Minamata Convention follow precipitation patterns, as policy avoids increases in the global background mercury concentration.

Because mercury is persistent in the environment, anthropogenic emissions also enrich reservoirs of mercury in the subsurface ocean and soils. Mercury from these pools can enhance reemissions, contributing further to deposition. Our GEOS-Chem simulations take into account the effect of anthropogenic emissions changes on concentrations of mercury in surface reservoirs only, and consequently underestimate the total deposition benefits attributable to policy. To roughly estimate the extent of this underestimation, we use a seven-box, biogeochemical model developed by Amos et al. (28, 29), which captures the deep ocean and soil reservoirs, but not the spatial distribution of impacts (*SI Appendix, Chemical transport modeling*). We find that globally, deposition reductions under policy are $\sim 30\%$ larger when taking into account enrichment of these subsurface pools.

Recent research suggests that fish concentrations in ocean (30–32) and freshwater (33–36) fish will likely respond proportionally to changes in atmospheric inputs over years to decades, although the magnitude and timing of a full response may be variable, depending on the region (see refs. 32 and 37–39 for examples). For our base case scenario, we assume that fish MeHg in both freshwater and marine ecosystems responds after 10 y to proportionally reflect changes in atmospheric inputs (we test the response to this assumption

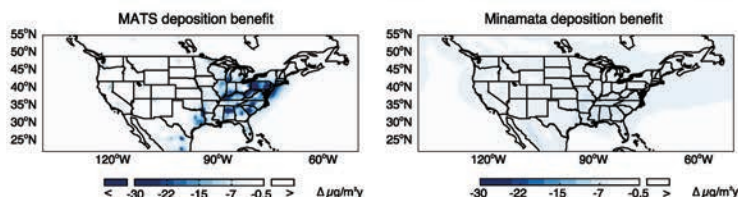


Fig. 1. Projected net deposition benefits ($\Delta\mu\text{g}/\text{m}^2/\text{y}$) of MATS and the Minamata Convention over NP over the contiguous United States, at $0.5^\circ \times 0.667^\circ$ resolution. Global results, at $4^\circ \times 5^\circ$ resolution, are shown in *SI Appendix, Fig. S4*.

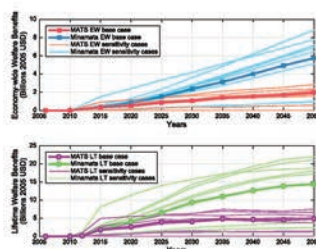


Fig. 2. Trajectories of welfare benefits under global and domestic policy until 2050, discounted at 3%. (Top) Modeled EW benefits realized in a given year. (Bottom) Projected LT benefits for that year's affected population. Base cases are indicated with markers. Unmarked lines show the range of trajectories from sensitivity cases.

in our sensitivity analysis) (30, 37). We specify base year blood MeHg, as a biomarker for MeHg exposure, by region, based on the National Health and Nutrition Examination Survey (40). We then scale blood concentrations based on the change in intake of fish MeHg (change in deposition plus time lag), taking into account consumption of domestic freshwater and imported fish species from global fisheries, using data from US seafood market studies (41) and data compiled by the US Environmental Protection Agency on noncommercial anglers (15, 42). Because of data limitations, we consider noncommercial mercury intake from local, freshwater fish only. We treat noncommercial marine anglers as average US consumers of marine and estuarine fish. This may slightly underestimate the benefits of MATS in our work; however, further data are necessary to quantify the MeHg intake of noncommercial anglers in different US coastal regions (see *SI Appendix, Changes in human exposure* for detailed methods).

Calculated average US mercury intake in 2050, assuming a 10-y time lag between deposition changes and fish response, as well as constant fish intake patterns, is 91% less under our Minamata scenario than under NP (*SI Appendix, Fig. S5*). Our MATS scenario reduces intake by 32% compared with the NP case. Although the deposition decreases over the United States are roughly equivalent between the MATS and Minamata scenarios, changes to modeled mercury intake are larger under the latter. More than 90% of the US commercial fish market, and the majority of US mercury intake, comes from marine and estuarine sources, particularly from Pacific and Atlantic Ocean basins (41, 43). These regions are heavily influenced by emissions from non-US sources, including East and South Asia. In addition, even locally caught freshwater fish are affected by the long-range transport of mercury emissions. Regional differences in the geographic source of dietary fish (*SI Appendix, Changes in human exposure*) and deposition lead to variations in intake change patterns across scenarios, as shown in *SI Appendix, Fig. S4*. The majority of modeled MeHg intake in the North Central region (*SI Appendix, Fig. S5*) is from self-caught, local freshwater fish, leading to a diminished intake benefit from the Minamata scenario relative to the MATS scenario. The opposite pattern holds for New York. These differences in intake lead to corresponding differences in IQ deficits and cardiovascular outcomes (see *SI Appendix, IQ effects: Cardiovascular impacts; and Health impacts for health impacts methods and results, respectively*).

Annual US economic benefits to 2050 (applying a 3% discount rate) from avoided health impacts under domestic and global mercury policies under our base case assumptions, relative to NP, are presented in Fig. 2. We use two economic valuation approaches: the first, a cost-of-illness and value of statistical life

(VSL) approach, estimates projected lifetime (LT) benefits of avoided exposure for those born by 2050 and is consistent with US regulatory practice; the second, a human capital approach, estimates economy-wide (EW) benefits realized by 2050 from avoided labor productivity and wage losses. Given differences in methodology, results from these two approaches are not directly comparable (see *SI Appendix, Economic modeling of health impacts* for more details). To estimate LT benefits of avoided health effects, we apply estimates of projected lost wages and medical costs for IQ deficits and nonfatal acute myocardial infarctions (heart attacks), and VSL for premature fatalities resulting from myocardial infarctions (see ref. 12 and examples listed in ref. 44 of studies that use this approach), for each year's projected birth cohort (IQ) and affected adult population (heart attacks). The second method uses the US Regional Energy Policy model, a computable general equilibrium model of the US economy (45). Consistent with previous work valuing economic effects of air pollution through computable general equilibrium modeling (46), we take into account the effects of IQ deficits and fatal and nonfatal heart attacks on the labor force, and its cumulative effect over time. Base case cumulative EW benefits of the Minamata Convention to the United States by 2050 are \$104 billion (2005 USD) (Fig. 2, Top, blue line), and cumulative LT benefits for those born by 2050 are \$339 billion (Fig. 2, Bottom, green line). EW benefits from our MATS scenario (Fig. 2, Top, red line) are \$43 billion by 2050, and LT benefits are \$147 billion (Fig. 2, Bottom, purple line). Both EW and LT benefits are dominated (>90% for LT and >99% for EW) by avoided cardiovascular effects, consistent with previous studies, including these health endpoints (12, 16). Relative to US domestic action, estimated cumulative benefits from the Minamata Convention are more than twice as large.

Considered per unit of avoided emissions, however, the projected benefits of MATS to the United States are larger than those of the Minamata Convention: \$324 million/Mg compared with \$46 million/Mg for EW benefits by 2050, and \$1.1 billion/Mg compared with \$150 million/Mg for LT benefits for those born by 2050. Given its global scope, the Minamata Convention is likely to prevent more emissions than MATS. However, as mercury pollution has effects on both local and global scales, avoided emissions within the United States, on a per unit basis, lead to larger benefits.

Policies-to-Impacts Sensitivity Analysis. We assess uncertainty and variability along the policies-to-impacts pathway by identifying key drivers of uncertainty in our base case integrated model, and calculating how changes in assumptions affect our quantification of US benefits from the Minamata Convention, MATS, and relative benefits. Key assumptions addressed here include the effect of atmospheric chemistry, ecosystem time lags, dietary choices, dose-response parameters linking MeHg exposure and health effects, economic costs, and discount rates. We run the integrated model for realistic and policy-relevant low and high bounds for these assumptions. Fig. 2 shows the range of calculated benefits from these sensitivity scenarios, described further here. The uncertain range spanned by these cases is illustrated by the lines in Fig. 2; however, the bounds delineated by these lines for the Minamata (blue/green) and MATS (red/purple) scenarios are not independent. Some sensitivity scenarios lead to the same directional change in benefits over the base case for both the domestic and global scenario, such that the magnitude of cumulative benefits for the Minamata scenario remain larger than for MATS. This result is illustrated in Fig. 3, which shows the range in ratio of benefits between Minamata and MATS, under different sensitivity scenarios. Details of the low and high cases addressed are presented in *SI Appendix, Table S7 and Sensitivity analysis*.

Our low and high cases for atmospheric chemistry bound uncertainty about the form of mercury emissions and atmospheric redox reactions. Although policies address total mercury emissions, emissions of mercury occur as different chemical species with different atmospheric lifetimes. Mercury emitted in its elemental form, Hg(0), has an atmospheric lifetime of 6 mo to a year, enabling it to transport globally before its oxidation and

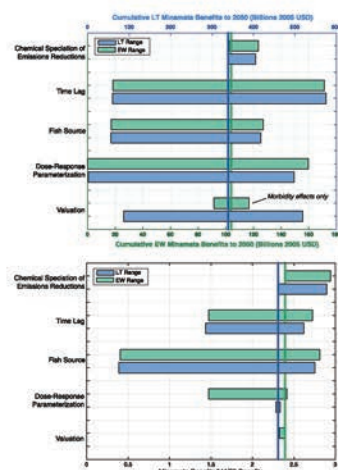


Fig. 3. (Top) Range in cumulative benefits of the Minamata scenario to 2050. Note the different scales for LT and EW benefits. (Bottom) Range in ratio of cumulative benefits to 2050 (Minamata Benefits/MATS Benefits). Blue and green lines show base case results for LT and EW benefits, respectively. Bars indicate the sensitivity of cumulative benefits to high and low case assumptions for uncertain parameters.

subsequent deposition. Mercury emitted in its oxidized form, Hg(II), in the gas phase, or Hg(P) in the particle phase, is more soluble and can deposit closer to its source. In addition, the speciation of present-day mercury emissions is uncertain. Reduction reactions may convert Hg(II) to Hg(0), lengthening its lifetime; this process may occur in the atmosphere in the aqueous phase (47), or in power plant plumes (48, 49). However, the mechanism of potential reduction is unknown. To bound this uncertainty, we assume for our low case that 90% of global Hg reductions over NP occur as Hg(II) or Hg(P), and for the high case, that 90% of reductions occur as Hg(0). This results in a range of cumulative EW benefits for Minamata between \$102 billion (low) and \$123 billion (high) in 2005 USD, and a range of LT benefits of \$338 billion to \$405 billion. That the low case results in only a small difference from the base case reflects the emphasis on control technologies that capture oxidized mercury in the base case assumptions (19). The relative benefits of Minamata versus our MATS case vary to a factor of 2.9 from the base case. If policy prevents primarily Hg(0) emissions, or there is a high rate of in-plume reduction, there is greater long-range benefit to the United States and global oceans from avoided emissions occurring elsewhere.

If fish MeHg responds rapidly and quantitatively to changes in deposition, cumulative EW and LT benefits to 2050 from Minamata are projected to be \$171 billion and \$575 billion (2005 USD), whereas a slower response reduces projected EW and LT benefits to \$18 billion and \$60 billion. Although reductions in mercury deposition, all else equal, will eventually result in decreased environmental and fish concentrations, benefits within a given time horizon, which in this case is 2050, will depend on how long ecosystems take to respond. Estimated economic

benefits are therefore highly sensitive to the temporal scope of analysis. For instance, EW benefits from IQ effects are primarily accrued when those in birth cohorts with reduced exposure are of working age (see *SI Appendix, Economic modeling of health impacts*), and consequently are not fully captured by our 2050 time horizon. Population growth and discounting assumptions (we use a 3% discount rate; see *SI Appendix, Economic valuation* for others) also influence our cumulative benefit assessment. Timing effects are further discussed in *SI Appendix, Economic valuation*. Our lower bound incorporates an instantaneous response, which is the assumption commonly used in regulatory analyses (15, 42), and that may be roughly consistent with the behavior of certain classes of freshwater bodies (37). Our upper bound is 50 y, consistent with the high range of estimated response times for surface open ocean waters (30), where MeHg production and biomagnification are hypothesized to occur (31), and midrange estimates for watershed-fed coastal ecosystems and some lake systems, which may be the slowest to respond to changes in atmospheric deposition (32, 36).

Population dietary choice between local freshwater and global market fish alters our Minamata base case cumulative EW benefits from \$17 billion (2005 USD) to \$127 billion, and cumulative LT benefits from \$56 billion to \$418 billion. Our base case assumes that population dietary choices between local fish and global market fish remain constant over time. For low and high bounds, respectively, we assume that people's diets are 100% from either local freshwater or global sources. Where US seafood consumers eat a larger fraction of market marine and estuarine fish, benefits from Minamata are higher. Under the 100% local freshwater diet assumption, benefits from MATS exceed those of Minamata (Minamata/MATS ratio of 0.4 in Fig. 3).

With different assumptions about pharmacokinetics and dose-response functions between mercury intake and human health effects, our results for the Minamata scenario vary from \$6 million to \$160 billion (2005 USD) in EW benefits, and from \$1.4 billion to \$498 billion in LT benefits. Although convincing evidence is present to associate MeHg with adverse human effects at low to medium doses, particularly for IQ deficits (7, 50), there may be variability in the magnitude of this effect; for instance, because of genetic variability (51). As a result, we use 95% confidence interval bounds for high and low cases for biomarker and dose-response parameters (*SI Appendix, Table S3*). Associations between mercury exposure and cardiovascular impacts are less certain than IQ effects (9). Previous studies have expressed this uncertainty, using an expected value approach taking into account both the plausibility of a relationship between MeHg and cardiovascular impacts and uncertainties in the parameters of the relationship (12). Our lower bound does not include cardiovascular impacts, whereas our base case and upper bound do, with the 97.5 percentile estimate of the relationship between hair mercury and heart attack risk used in the high case (*SI Appendix, Sensitivity Analysis*) (52). A more detailed review of the epidemiological evidence contributing to these parameterizations is given in *SI Appendix, IQ effects and Cardiovascular impacts*. Although using different exposure-response functions leads to the largest absolute range in cumulative benefits among the sensitivity cases considered (Fig. 3), the relative benefits between Minamata and MATS do not change as substantially.

High and low assumptions for the economic valuation of mercury-related health effects lead to a range of \$58 billion to \$121 billion (2005 USD) in EW benefits from the Minamata scenario by 2050, and a range of \$87 billion to \$518 billion in LT benefits. Our sensitivity scenarios for EW benefits address only morbidity, and not mortality, effects: medical costs associated with heart attacks, and the relationship between IQ deficits and lost earnings. We use the 95% confidence interval for the IQ to income relationship and the range of estimates for medical costs from the literature as bounding cases (*SI Appendix, Table S7*). For LT valuations, we use central and range estimates for VSL and LT lost income from regulatory literature (15, 53). The valuation uncertainties considered have the smallest effect on the ratio of benefits between global and domestic scenarios (Fig. 3).

Implications for Policy Evaluation. We developed and applied an assessment method to examine the complex pathways from policies to environmental effects for global toxic pollution from mercury that accounts for uncertainties and knowledge gaps in a structured way. We showed, using this method, that by 2050, the Minamata Convention could have approximately twice the benefit of our scenario simulating domestic actions (\$104 billion compared with \$43 billion in cumulative EW benefits, and \$339 billion compared with \$147 billion in cumulative LT benefits). The relative benefit is robust to several uncertainties assessed along the policies-to-impacts pathway, including atmospheric chemical processes, ecosystem time lags, and exposure-response relationships; however, we find that domestic action has a larger benefit when dietary fish is sourced from local freshwater bodies. Per megagram of avoided emissions, the benefits to the United States of domestic action are nearly an order of magnitude larger than global action, highlighting that although mercury is a global pollutant, local policies contribute strongly to local benefits. As shown in *SI Appendix, Fig. S4*, avoided emissions associated with the Minamata Convention outside of the United States may lead to large benefits in Asia and Southern Europe. Abatement costs will also vary by region.

Although we have conducted what is, to our knowledge, the first global-scale attempt to link future emissions trajectories to domestic impacts, our ability to incorporate detailed models of the entire pathway is limited by existing scientific knowledge. In addition to these knowledge gaps, there are also variabilities in mercury's behavior across ecosystems and regions, as well as in human responses (physical and social). Our approach uses bounding assumptions along the policies-to-impacts pathway as a proxy to assess the relative influence of various uncertainties, from a range of disciplines. In a number of previous analyses, range in the benefits of mercury reduction has been specified by the range in exposure-response functions (12, 13). Although our analysis underlines the importance of these uncertainties, particularly those related to cardiovascular effects, it also suggests that previous approaches miss other potentially large contributors to uncertainty in economic effects (particularly within a given time horizon), such as marine and freshwater ecosystem dynamics and dietary intake variabilities.

Although, all else being equal, mercury emissions reductions will ultimately result in exposure reductions, our analysis indicates that uncertainties in ecosystem dynamics affecting the timescale of these reductions will strongly influence benefits within a given time horizon. Many of the processes affecting the conversion of inorganic mercury to MeHg and subsequent uptake in biota are poorly understood, particularly in marine ecosystems (54, 55). In addition, there is variability among ecosystem types, both freshwater (37) and marine and estuarine (32), in how quickly these systems and biota within them respond to changes in deposition. As described previously, our analysis focuses on changes to mercury in surface reservoirs, and accounting for these effects could increase benefits estimates by ~30%. Future research should more fully address the timescales of reemissions from subsurface reservoirs, both land and ocean, and their effects on benefits estimates. Better understanding of mercury cycling, methylation and bioaccumulation processes, their variability, and the potential effects of global changes to climate, land use, and other environmental contaminants will be critical for improving policy evaluation (56), particularly for better understanding the distribution of benefits between current and future generations.

Our analysis also reveals the importance of social factors in estimating the absolute and relative benefits of different policies. Dietary choices, including fish selection and consumption rate, can have a potentially larger influence on the ratio of benefits from global compared with domestic action than substantial scientific uncertainties about mercury's environmental behavior. This sensitivity result suggests that domestic actions may be particularly important for reducing exposure for communities that consume mostly fish sourced from the contiguous United States, such as certain Indigenous peoples and immigrant groups,

subsistence fishers, and recreational anglers. In addition, it highlights the policy need for analysis and data collection on the evolving patterns in fisheries production and fish consumption (43). It has been noted that dietary guidance on fish selection and consumption frequency could be part of an adaptation strategy to minimize mercury exposure (57), and our results point toward their potentially large effect as a policy lever. However, dietary advice is highly complex. Fish consumption, and specific fish selection, can have substantial benefits, both nutritional (58, 59) and sociocultural (60). Balancing the risks and benefits of fish consumption therefore requires careful consideration of contextual factors. Even with such adaptive approaches, there is continued need to mitigate future emissions.

Although uncertainties related to chemical speciation of emissions reductions led to the smallest range in cumulative benefits for the Minamata scenario, interactions between these uncertainties and variabilities in dietary fish source could affect the relative benefits of global versus domestic action. At this time, our ability to constrain these speciation uncertainties is partially limited by measurement challenges (61). Improved measurement techniques could provide insight into distributional aspects of control policies.

Differences in valuation methods for health endpoints could lead to substantial variation in benefits estimates. Our two valuation approaches highlight some of these potential variations: Our EW approach emphasizes compounding economy-wide gains over time, but considers only effects to the economy (not individuals) realized within the 2050 time horizon; in contrast, our LT approach more closely resembles regulatory studies, taking into account projected lifetime and nonmarket effects to individuals (e.g., pain and suffering). As highlighted previously, economic benefits estimates are very sensitive to choices of temporal scope of analysis and discounting. Estimates are also sensitive to the endpoints considered: In addition to the health effects considered here, there may be other human and wildlife health endpoints not included in this study that, although not well characterized at this time (7), may also have economic effects. No less important, there may be dimensions of individual and community health and well-being that are not quantifiable within this economic framework, which should be considered in a holistic assessment of policy benefits (62).

Our assessment of US benefits from global and domestic policy is designed to be illustrative, drawing attention to uncertainties in estimating economic benefits and methods to take these uncertainties into account. As a consequence, our estimates should not be taken as a comprehensive projection of impacts. However, as scientific knowledge evolves, many uncertainties can be addressed using similar methodology. Policies-to-impacts analyses similar to the one presented here can be valuable for synthesizing available information, identifying its limitations, and when combined with sensitivity analysis, suggesting areas where scientific data collection to narrow uncertainty would lead to uncertainty reduction of importance to policy-making.

Materials and Methods

Brief explanations of methods have been included throughout *Results and Discussion*. In the *SI Appendix, Supplementary methods*, we provide a detailed description of methodology and data sources for emissions projections, chemical transport modeling, translating changes in deposition to changes in human exposure, IQ and cardiovascular impacts modeling, economic modeling of health impacts, and sensitivity analysis. Institutional review and informed consent were not necessary for this modeling study, as all human health and ecosystem input data were drawn from published sources.

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1. Rockström J, et al. (2009) A safe operating space for humanity. *Nature* 461(7283): 472–475.
2. Selin N (2014) Global Environmental Law and Treaty-Making on Hazardous Substances: The Minamata Convention and Mercury Abatement. *Glob Environ Politics* 14(1):1–19.
3. Lamborg C, et al. (2014) A global ocean inventory of anthropogenic mercury based on water column measurements. *Nature* 512(7512):65–68.
4. Amos HM, et al. (2015) Observational and modeling constraints on global anthropogenic enrichment of mercury. *Environ Sci Technol* 49(7):4036–4047.
5. Driscoll CT, Mason RP, Chan HM, Jacob DJ, Pirrone N (2013) Mercury as a global pollutant: Sources, pathways, and effects. *Environ Sci Technol* 47(10):4967–4983.
6. Grandjean P, Satoh H, Murata K, Eto K (2010) Adverse effects of methylmercury: Environmental health research implications. *Environ Health Perspect* 118(8): 1137–1145.
7. Karagas MR, et al. (2012) Evidence on the human health effects of low-level methylmercury exposure. *Environ Health Perspect* 120(6):799–806.
8. Sheehan MC, et al. (2014) Global methylmercury exposure from seafood consumption and risk of developmental neurotoxicity: A systematic review. *Bull World Health Organ* 92(4):254–269.
9. Roman HA, et al. (2011) Evaluation of the cardiovascular effects of methylmercury exposure: Current evidence supports development of a dose-response function for regulatory benefits analysis. *Environ Health Perspect* 119(5):607–614.
10. Trasande L, Landrigan PJ, Schechter C (2005) Public health and economic consequences of methylmercury toxicity to the developing brain. *Environ Health Perspect* 113(5):550–556.
11. Spadaro JV, Rabl A (2008) Global health impacts and costs due to mercury emissions. *Risk Anal* 28(3):403–413.
12. Rice GE, Hammitt JK, Evans JS (2010) A probabilistic characterization of the health benefits of reducing methylmercury intake in the United States. *Environ Sci Technol* 44(13):5216–5224.
13. Bellenger M, et al. (2013) Economic benefits of methylmercury exposure control in Europe: Monetary value of neurotoxicity prevention. *Environ Health* 12:3.
14. Griffiths C, McGartland A, Miller M (2007) A comparison of the monetized impact of Hg decrements from mercury emissions. *Environ Health Perspect* 115(8):841–847.
15. US Environmental Protection Agency (2011) Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards (US Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC).
16. Rice GE, Hammitt JK (2005) Economic Valuation of Human Health Benefits of Controlling Mercury Emissions from U.S. Coal-Fired Power Plants. (Northeast States for Coordinated Air Use Management, Boston, MA).
17. Selin NE (2014) Global change and mercury cycling: Challenges for implementing a global mercury treaty. *Environ Toxicol Chem* 33(6):1202–1210.
18. United Nations Environment Programme. (2013) Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport. (UNEP Chemicals Branch, Geneva, Switzerland).
19. Streets DG, Zhang Q, Wu Y (2009) Projections of global mercury emissions in 2050. *Environ Sci Technol* 43(8):2983–2988.
20. Gang A, Stokes LC, Streets DG, Corbett ES, Selin NE (2015) Impacts of the minamata convention on mercury emissions and global deposition from coal-fired power generation in Asia. *Environ Sci Technol* 49(9):5326–5335.
21. US Environmental Protection Agency (2011) RFA Analysis of the Final Mercury and Air Toxics Standards (US Environmental Protection Agency, Clean Air Markets Division, Washington, DC).
22. Selin NE, et al. (2008) Global 3-D land-ocean-atmosphere model for mercury: Present-day versus preindustrial cycles and anthropogenic enrichment factors for deposition. *Global Biogeochem Cycles* 22(2):1–13.
23. Soerensen AL, et al. (2010) An improved global model for air-sea exchange of mercury: High concentrations over the North Atlantic. *Environ Sci Technol* 44(22): 8774–8780.
24. Holmes CD, et al. (2010) Global atmospheric model for mercury including oxidation by bromine atoms. *Atmos Chem Phys* 10(24):12037–12057.
25. Amos HM, et al. (2012) Gas-particle partitioning of atmospheric Hg^{0} and its effect on global mercury deposition. *Atmos Chem Phys* 12(1):591–603.
26. Zhang Y, et al. (2012) Nested-grid simulation of mercury over North America. *Atmos Chem Phys* 12:6095–6111.
27. Corbett ES, Jacob DJ, Holmes CD, Streets DG, Sunderland EM (2011) Global source-receptor relationships for mercury deposition under present-day and 2050 emissions scenarios. *Environ Sci Technol* 45(24):10477–10484.
28. Amos HM, Jacob DJ, Streets DG, Sunderland EM (2013) Legacy impacts of all-time anthropogenic emissions on the global mercury cycle. *Global Biogeochem Cycles* 27(2):410–421.
29. Amos HM, et al. (2014) Global biogeochemical implications of mercury discharges from rivers and sediment burial. *Environ Sci Technol* 48(16):9514–9522.
30. Sunderland EM, Mason RP (2007) Human impacts on open ocean mercury concentrations. *Global Biogeochem Cycles* 21(4):GB4022.
31. Mason RP, et al. (2012) Mercury biogeochemical cycling in the ocean and policy implications. *Environ Res* 119:101–117.
32. Chen C, et al. (2012) Sources to Seafood: Mercury Pollution in the Marine Environment (Toxic Metals Superfund Research Program, Dartmouth College, Hanover, NH).
33. Harris RC, et al. (2007) Whole-ecosystem study shows rapid fish-mercury response to changes in mercury deposition. *Proc Natl Acad Sci USA* 104(42):16586–16591.
34. Evers DC, et al. (2011) Mercury in the Great Lakes region: Bioaccumulation, spatiotemporal patterns, ecological risks, and policy. *Ecotoxicology* 20(7):1487–1499.
35. Drewnick PE, et al. (2012) Spatial and temporal patterns of mercury accumulation in lacustrine sediments across the Laurentian Great Lakes region. *Environ Pollut* 161: 252–260.
36. Vijayaraghavan K, Levin L, Parker L, Yarwood G, Streets D (2014) Response of fish tissue mercury in a freshwater lake to local, regional, and global changes in mercury emissions. *Environ Toxicol Chem* 33(6):1238–1247.
37. Knightes CD, Sunderland EM, Craig Barber M, Johnston JM, Ambrose RB (2009) Application of ecosystem-scale fate and bioaccumulation models to predict fish mercury response times to changes in atmospheric deposition. *Environ Toxicol Chem* 28(4):881–893.
38. Selin NE, Sunderland EM, Knightes CD, Mason RP (2010) Sources of mercury exposure for U.S. seafood consumers: Implications for policy. *Environ Health Perspect* 118(1): 137–143.
39. Drenner RW, et al. (2013) Effects of mercury deposition and coniferous forests on the mercury contamination of fish in the South Central United States. *Environ Sci Technol* 47(3):1274–1279.
40. Mahaffey KR, Clickner RP, Jeffries KA (2009) Adult women's blood mercury concentrations vary regionally in the United States: Association with patterns of fish consumption (DHANES 1999–2004). *Environ Health Perspect* 117(1):47–53.
41. Sunderland EM (2007) Mercury exposure from domestic and imported estuarine and marine fish in the U.S. seafood market. *Environ Health Perspect* 115(2):235–242.
42. US Environmental Protection Agency (2005) Regulatory Impact Analysis of the Final Clean Air Mercury Rule. (US Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC).
43. Karim R, Fitzgerald TP, Fisher NG (2012) A quantitative synthesis of mercury in commercial seafood and implications for exposure in the United States. *Environ Health Perspect* 120(11):1512–1519.
44. Bell ML, Morgenstern RD, Harrington W (2011) Quantifying the human health benefits of air pollution policies: Review of recent studies and new directions in accountability research. *Environ Sci Policy* 14(6):357–368.
45. Rausch S, Metcalf GE, Reilly JM (2010) Distributional Implications of Alternative U.S. Greenhouse Gas Control Measures. (National Bureau of Economic Research Working Paper 16023, Cambridge, MA).
46. Saari KK, Selin NE, Rausch S, Thompson TM (2015) A self-consistent method to assess air quality co-benefits from U.S. climate policies. *J Air Waste Manag Assoc* 65(1): 74–89.
47. Sulis M, Ariya PA, Dastoor AP (2012) A review of the sources of uncertainties in atmospheric mercury modeling II. Mercury surface and heterogeneous chemistry – A missing link. *Atmos Environ* 46:1–10.
48. Landis MS, Ryan JV, Ser Schure AH, Laudal D (2014) Behavior of mercury emissions from a commercial coal-fired power plant: The relationship between stack speciation and near-field plume measurements. *Environ Sci Technol* 48(22):13540–13548.
49. Tong Y, et al. (2014) Comparison of heterogeneous photolytic reduction of Hg^{0} in the coal fly ashes and synthetic aerosols. *Atmos Res* 138:324–329.
50. NRC (2000) Toxicological Effects of Methylmercury. (National Research Council, National Academy Press, Washington, DC).
51. Basu N, Goodrich JM, Head J (2014) Ecogenetics of mercury: From genetic polymorphisms and epigenetics to risk assessment and decision-making. *Environ Toxicol Chem* 33(6):1248–1258.
52. Virtanen JK, et al. (2005) Mercury, fish oils, and risk of acute coronary events and cardiovascular disease, coronary heart disease, and all-cause mortality in men in eastern Finland. *Arterioscler Thromb Vasc Biol* 25(1):228–233.
53. ITRI International. (2015) Environmental Benefits Mapping and Analysis Program – Community Edition: User's Manual Appendices. (Research Triangle Park, NC).
54. Lamborg C, et al. (2014) Mercury in the Anthropocene Ocean. *Oceanography (Mash D)* 27(1):76–87.
55. Huo-Kim K, Kucharyk KH, Zhang T, Deshusses MA (2013) Mechanisms regulating mercury bioavailability for methylating microorganisms in the aquatic environment: A critical review. *Environ Sci Technol* 47(6):2441–2456.
56. Sundeth K, Paynau JM, Barel A, Paynau EC, Raulo A (2015) Climate change impacts on environmental and human exposure to mercury in the Arctic. *Int J Environ Res Public Health* 12(6):3579–3595.
57. Xue L, et al. (2015) Modeling tribal exposures to methyl mercury from fish consumption. *Sci Total Environ* 533:102–109.
58. Oken E, et al. (2012) Which fish should I eat? Perspectives influencing fish consumption choices. *Environ Health Perspect* 120(6):790–798.
59. Mozaffarian D, Rimm EB (2006) Fish intake, contaminants, and human health: Evaluating the risks and the benefits. *JAMA* 296(15):1885–1889.
60. O'Neill CA (2004) Mercury, Risk, and Justice. *Environ Law Rev* 34(12):1070–1115.
61. Jaffe DA, et al. (2014) Progress on understanding atmospheric mercury hampered by uncertain measurements. *Environ Sci Technol* 48(13):7204–7206.
62. Ranco DJ, O'Neill CA, Donato J, Harper BL (2011) Environmental Justice, American Indians and the Cultural Dilemma: Developing Environmental Management for Tribal Health and Well-being. *Environ Justice* 4(4):221–230.

Ms. DEGETTE. Thank you very much, Doctor.
The Chair is now pleased to recognize Dr. Landrigan for 5 minutes.

STATEMENT OF PHILIP J. LANDRIGAN

Dr. LANDRIGAN. Thank you, Madam Chair, Ranking Member Guthrie, for having invited me to testify before you.

I come before you today as a pediatrician to talk about the impacts that mercury and particulate air pollution have on children. And when I say "children," I mean unborn children in the womb, infants, and children as they're growing up across the span of childhood.

And in my mind, the strongest reason for having a strong MATS rule is to protect the health of children and then to protect the health of future generations.

So why the focus on children? Children are exquisitely vulnerable to hazards in the environment. I chaired a committee at the National Academy of Sciences that looked at this issue for 5 years, from 1988 to 1993. And we identified a series of reasons why children are more vulnerable than adults to toxic chemicals in the environment.

First, the children are more heavily exposed. They breathe 4 times as much air per day per pound of body weight as an adult, and therefore they will take much more proportionately of any foreign material into their body that's in the air.

Secondly, they're biologically more vulnerable. A child's brain throughout the 9 months of pregnancy and on across childhood is rapidly—the cells in their brain are dividing, multiplying, and migrating according to precisely defined sequences. By the time a child is born, there are approximately a billion cells in the brain, 3 billion precisely engineered connections between and among those cells. If any toxic chemical gets into the body of a child during those complex, tightly choreographed processes of early development, things can go badly wrong, especially any chemical that directly damages the nervous system.

And this is the case for methyl mercury. We heard about methyl mercury. A major source are emissions from coal-fired power plants that go through the atmosphere and get into fish, and then people consumer the fish.

And if a pregnant mom consumes high levels of methyl mercury during pregnancy, we know from tragic experience 50 years ago in Japan that the impacts can be devastating. In a place called Minamata, Japan, there was an epidemic of terrible neurological disease in newborn infants in which babies were born with small heads, blind, deaf, profoundly retarded, and spastic.

Just as research on lead has shown us that gross obvious clinically detectable poisoning is only the tip of the iceberg, so too for mercury. We now know that even down to the lowest levels of mercury that are measurable, that mercury can damage the developing brain of an unborn child and infant and a child to produce a whole range of abnormal effects. We've heard about reduced IQ, also a shortened attention span, also behavioral problems.

There are two points I really want to emphasize in regard to the neurological damage that mercury causes to children. Number one,

this damage occurs down to the lowest measurable levels. There is no safe threshold. Standards that regulate the level of mercury in air are important, but they're no guarantee of safety. Damage occurs at levels of exposure below those artificial standards.

And the second important point is that this damage is permanent. It's irreversible. It's not treatable by any known medical treatment. And therefore, the only rational approach to dealing with it is to prevent it.

With that as background, I urge you to take the steps that are necessary to protect the underpinnings, the legal underpinnings, of the MATS rule to protect our children today and future generations.

The MATS rule has been a tremendous success. It's reduced levels of mercury in the environment by more than 85 percent, which means that a generation of children born in the past 10 or 15 years is being exposed to much lower levels of mercury than their predecessors. The situation here is very analogous to what happened back in the 1970s when EPA took lead out of gasoline. At that time, we were putting 100,000 tons of lead into gasoline each year in this country. The average blood lead level in our children was close to 20 micrograms. Starting in 1975, EPA directed that lead be taken out of gasoline in a phased process. Over the next decade, blood levels in American children declined by more than 90 percent. Acute lead poisoning virtually has gone away in this country. Every child born since 1980 has five more IQ points than children born before that time because of the reduction in lead.

I recall that, back in 1982, then-EPA Administrator Anne Gorsuch tried to put lead back into gasoline. Congress rebuffed her, and the lives of American children were saved. Their health and their brains were preserved into the future.

I urge you to do the same today. Thank you.

[The prepared statement of Dr. Landrigan follows:]



BOSTON COLLEGE

TESTIMONY

before

The Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
of the
U.S. House of Representatives

on the

**U.S. Environmental Protection Agency's Proposed Revision of
Mercury and Air Toxics Standards for Power Plants**

Washington, D.C.
May 21, 2019

PHILIP J. LANDRIGAN, MD, MSc, FAAP

DIRECTOR, GLOBAL PUBLIC HEALTH PROGRAM
SCHILLER INSTITUTE FOR INTEGRATED SCIENCE AND SOCIETY
BOSTON COLLEGE

Good Morning,

Madame Chair DeGette, Mr. Ranking Member Guthrie and Members of the Subcommittee on Oversight and Investigations. I thank you for having invited me to appear before you.

My name is Philip J. Landrigan. I am a pediatrician and public health physician. I serve currently as Director of the Program in Global Public Health and the Common Good and Director of the Global Observatory on Pollution and Health at Boston College. I am also a Professor of Biology at Boston College.

From 1985 to 2018, I was a member of the faculty of the Icahn School of Medicine at Mount Sinai in New York City. At Mount Sinai, I was Professor of Preventive Medicine and Pediatrics, Chairman of the Department of Preventive Medicine from 1990 to 2015, and Dean for Global Health from 2010 to 2018. A key responsibility of the Department of Preventive Medicine that I chaired at Mount Sinai is to direct a federally funded program that provides medical treatment and follow-up to over 20,000 of the police officers, firefighters, paramedics, construction workers, and other brave men and women who served as first responders after the attacks on the World Trade Center of September 11, 2001. I am now Professor Emeritus of Preventive Medicine and Pediatrics at Mount Sinai.

For more than four decades, beginning in the early 1970s during my service at the Centers for Disease Control and Prevention I have conducted research in pediatrics and public health, and I have published this research extensively in leading peer-reviewed journals including *The New England Journal of Medicine*, *The Lancet*, and *Environmental Health Perspectives*. My research has focused especially on understanding the impacts of environmental pollutants on children's health. In 2014, I co-edited the first ever *Textbook in Children's Environmental Health*, a volume of 700 pages and 60 chapters, authored by 85 scientists from five continents and published by Oxford University Press. From 2015-2016, I served as co-chair of the Global Committee on Public Health, a body of 51 scientists from countries around the world. Our report, published in *The Lancet* in 2018 found that pollution in all its forms kills 9 million people around the world each year and that air pollution is responsible for at least 6.5 million of these deaths.

I am an elected member of the U.S National Academy of Medicine. I am a Fellow of the American Academy of Pediatrics.

I am a veteran of the United States Public Health Service and of the Medical Corps of the United States Navy. I retired from the Navy in 2006 at the rank of Captain (O-6).

I submitted my full curriculum vitae to Subcommittee staff in preparation for this hearing.

I appear here before you today to express my strong opposition to the U.S. Environmental Protection Agency's proposed revision of Mercury and Air Toxics Standards (MATS) for Power Plants. If they are implemented, these revised standards will cause disease, disability, shortened life expectancy and premature deaths in many thousands of Americans of all ages, and especially in children. If implemented, these revised standards will produce millions of dollars of economic loss in unnecessary health care costs and productivity losses. If implemented, these revised standards will undermine the security of the United States of America by reducing the health of our nation's citizens and the intellectual capacity of our children, who will be tomorrow's leaders.

Infants and children, including unborn children, are uniquely vulnerable to mercury and particulate air pollution.

All aspects of the environment have especially profound effects on children's health. Children are not little adults; they have more exposure to air pollution than adults because they breathe at a faster rate, have higher levels of physical activity, live closer to the ground and spend more time outdoors.¹ Children's developing organs – in particular the lungs and the brain – are exquisitely sensitive to environmental pollution. A child's lungs are formed before birth and they continue to grow throughout childhood until a child reaches adult height. Pollution exposure during lung formation can result in reduced lung growth. Thus, children who grow up in areas with higher air pollutant levels are likely to have lungs that are significantly smaller when they reach adulthood than children who grow up in less polluted environments.

Children's brains can be injured by small doses of toxic chemicals, like mercury, that appear not to harm adults. During the 9 months of pregnancy and throughout childhood, a child's brain is changing very rapidly, making new cells and establishing new connections between cells. It is this wondrously complex and highly choreographed development that makes a child's brain so powerful, but at the same time so susceptible to damage by toxic chemicals.

Mercury Pollution Harms Children's Health

Mercury occurs naturally in coal. When coal is burned, it releases mercury into the atmosphere. This mercury comes back down to the earth with the rain and snow. Some comes down close to the point of emission, and much of it travels long distance in the atmosphere and eventually enters rivers, lakes and the oceans. There, it is converted into a highly toxic chemical form, methylmercury and enters fish. Methylmercury bioaccumulates in the marine food chain, meaning that levels increase as mercury moves up the food chain and are highest in predatory fish at the top of the food chain such as tuna, swordfish, striped bass, and bluefish whose bodies contain the methylmercury that was present in the many smaller fish that they have eaten. Consumption of contaminated fish is the main route of human exposure to methylmercury. Methylmercury is a potent neurotoxicant that damages the brains of children, both during pregnancy when they are exposed to methylmercury as their mothers consume fish, and later, when they consume fish on their own.

Fetuses, infants, and children who are exposed to methylmercury face impaired neurological development and reduced cognitive abilities, memory, and language skills because of the toxic effects of methylmercury exposure on the developing human brain. These effects can range from mild ADHD and learning disabilities to very severe consequences, depending on the extent of exposure. Pediatricians counsel pregnant women to avoid eating large fish that contain high amounts of mercury, but physician guidance is not enough to protect children. It is the statutory responsibility of the EPA to keep harmful mercury out of the air in the first place so that children are not exposed to it. The Mercury and Air Toxics Standards (MATS) have been essential to that effort, and any weakening of the standards will put children at risk.

Particulate Air Pollution Harms Children's Health

Combustion of coal and oil in power plants releases large amounts of particulates – small airborne particles – into the atmosphere. Particulate air pollution, and especially pollution by fine airborne particulate matter of less than 2.5 microns in diameter, known as PM 2.5 pollution, is especially dangerous because fine particulates are small enough to enter deep into the lungs and even in some instances to enter the blood stream from where they can reach every organ of the human body and cause injury.

PM 2.5 air pollution has been shown through multiple clinical and epidemiological studies to cause disease, disability and death across the lifespan. In adults and children, PM 2.5 air pollution causes low birth weight and prematurity as well as pneumonia, bronchitis and asthma.² It also slows growth of the developing lungs.³ In adults, it contributes to heart disease,⁴ stroke, cancer, asthma, chronic obstructive pulmonary disease, diabetes, allergies, eczema, and skin aging⁵. There is growing evidence that air pollution contributes to dementia in older adults⁶ and affects brain development in children.⁷

Air Pollution Standards in the United States are an EPA Success Story

The Clean Air Act was passed by the Congress in 1970 and was signed into law by President Richard M. Nixon. It has subsequently been amended and strengthened by both Republican and Democratic administrations. Throughout its nearly

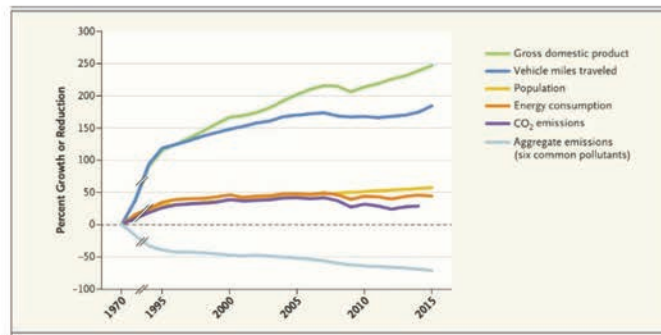
50 years of existence, the Clean Air Act has been guided by science. Permissible levels of pollutants in air have periodically been revised downward as new science has repeatedly shown that pollution levels previously considered to be "safe" were, in fact, not protective of human health and especially of children's health.

Since passage of the Clean Air Act in 1970, and despite an increase of more than 50% in the U.S. population, there has been a 70% reduction in emissions of criteria air pollutants (Fig. 1), and an increasing number of lives have been saved each year (160,000 in 2010).⁸

And contrary to the often-repeated claim that pollution prevention stifles economic growth, the GDP of the United States has increased by nearly 250% during these years in which our country was reducing air pollution by almost 70%. Substantial emission reductions have also been achieved for nearly 200 other hazardous air pollutants covered by the 1990 Clean Air Act Amendments.

Other evidence-based policy successes related to control of air pollution include a marked decrease in acid rain, with associated health benefits attributable to the associated decrease in fine particles, and reversal of the decline of the stratospheric ozone layer.⁹

Figure 1 Changes in Economic Indicators and Pollutant Emissions, 1970-2015.



Data are from the EPA (<https://gispub.epa.gov/air/trendsreport/2016/>).

The Mercury and Air Toxics Standards are an EPA Success Story

Prior to 2011, when EPA introduced MATS, only eleven states had implemented mercury emissions standards for power plants. Coal-fired power plants were the largest single source of unregulated mercury pollution in the United States.¹⁰ Since its implementation, MATS has been an incredibly successful public health intervention for children. *Mercury emissions from U.S. coal-fired power plants dropped by 89 percent in the 10-year period from 2007 to 2017 thanks to MATS.*¹¹

The reduction of particulate matter and other hazardous air pollutants due to MATS has had tremendous health impacts, which were even greater than earlier estimates of the anticipated benefits. According to EPA estimates, MATS prevents up to 11,000 premature deaths, 130,000 asthma attacks, 4,700 heart attacks, 5,700 hospital and emergency room visits, and 3.2 million days when people must restrict their activities each year.¹² This enormous impact does not even include estimation of the health and economic benefits that will result from prevention of developmental complications caused by

air pollution that will affect children for the rest of their lives. MATS is one of the most important public health protections ever put in place by the EPA to reduce mercury exposure in children.

Weakening MATS will Cause Child Health Consequences

If the MATS air pollution standards are weakened, children will be exposed to increased levels of mercury PM 2.5 as well as to other dangerous air pollutants that have negative consequences for their growing bodies and minds. Other toxics that have been reduced under the MATS standards include carcinogens and volatile organic compounds that not only cause immediate harm, but also react to form dangerous ozone smog. Anything less than the full continued enforcement of these standards could result in increased emissions of deadly pollutants, and child health impacts that should have been prevented under these fully implemented safeguards.

Weakening MATS Will Increase Health Care Costs, Cause Productivity Losses and Damage the American Economy

The damages to human health caused by methylmercury and PM2.5 particulate pollutants are extremely costly. Disease and disability caused by these two forms of pollution increase health care costs, and many of these costs fall on state and federal budgets. These diseases and disabilities also cause productivity losses now and in the future through reducing children's intelligence, undermining health, and shortening the life span of economically productive adults.

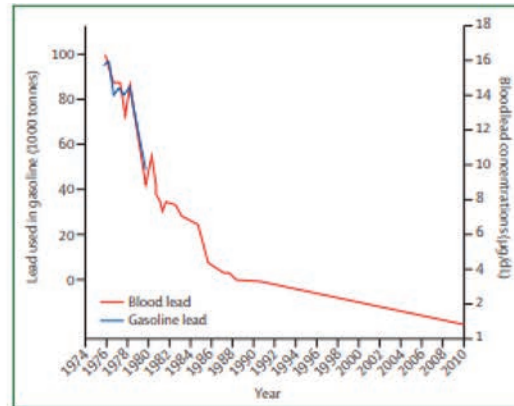
A 2011 analysis by my colleague Leonardo Trasande MD, estimated that methylmercury toxicity in American children costs this country an estimated \$5.1 billion per year (range of estimates = \$3.2 – 8.4 billion). Most of those costs are in the form of productivity losses in children whose intelligence and thus their creativity and economic productivity will be reduced across their entire lifetime by methylmercury exposure in early life. Of this total, \$1.3 billion (range, \$0.1-6.5 billion) each year is attributable to mercury emissions from American power plants.

This same analysis by Trasande found that illness in American children caused by particulate air pollution results in costs of \$2.2 billion per year (range of estimates = \$0.7 billion – 2.5 billion).

A further analysis of the economic benefits of controlling air pollution was produced by EPA itself. This study found that every dollar invested in control of ambient air pollution in the USA since 1970 has not only improved health,¹³ but is also estimated to have yielded US\$30 in economic benefits (95% CI \$4–88), a return on investment of 30:1.¹⁴

Yet another example of the health and economic benefits of addressing air pollution is seen in the consequences of removing lead from gasoline in the USA. This intervention by EPA began in 1975 and, within a decade, had reduced the mean blood concentration of lead in the population by more than 90% (Fig. 2). Further benefits of this highly successful intervention were that it almost eliminated childhood lead poisoning, and increased the cognitive capacity of all American children born since 1980 by 2–5 IQ points.¹⁵ This gain in intelligence has increased national economic productivity and will yield an economic benefit of US\$200 billion (range \$110 billion–300 billion) over the lifetimes of each annual class of children born since 1980,¹⁶ an aggregate benefit to-date of over \$6 trillion.^{17,18}

Figure 2 Correlation between population mean blood concentration of lead and lead use in gasoline in the USA, 1974-1991



Taken from data that is publicly available from the Centers for Disease Control.

An important footnote to the story of removal of lead from gasoline is that in 1982 Anne Gorsuch, then EPA Administrator, proposed to put lead back in gasoline. That effort was rebuffed by a courageous Congress.¹⁹

Conclusion

Regulating hazardous air pollutant emissions from power plants is appropriate and necessary to protect the health of all Americans, and especially the health of America's children. The Mercury and Air Toxics Standards prevent brain injuries, protect children's lungs and save lives. Without strong protections in place, America's children will disproportionately bear the burden of disease caused by pollutants emitted by power plants. Moreover, protecting America's children against air pollution benefits the economy of our country and enhances the present and future security of the United States of America.

I urge the EPA to maintain these critical standards, and oppose any weakening of the MATS rule.

Thank you.

References

1. Landrigan PJ (Chair): Pesticides in the Diets of Infants and Children. Committee on Pesticides in the Diets of Infants and Children. Board on Agriculture, and Commission on Life Sciences. National Research Council. Washington: National Academy Press, 1993.
2. McConnell R, Berhane K, Gilliland F, Molitor J, Thomas D, Lurmann F, Avol E, Gauderman J, Peters J. Prospective study of air pollution and bronchitic symptoms in children with asthma. *Am J Respir Crit Care Med*. 2003; 168: 790–797. [PubMed: 12893648]
3. Gauderman WJ, Urman R, Avol E, et al. Association of improved air quality with lung development in children. *N Engl J Med* 2015; 372: 905–13
4. Hoek G, Krishnan RM, Beelen R, et al. Long-term air pollution exposure and cardio-respiratory mortality: a review. *Environmental Health* 2013 ;12(1):43. Available from: <https://doi.org/10.1186/1476-069X-12-43>
5. Krutmann J, Bouloc A, Sore G, Bernard BA, Passeron T. The skin aging exposome. *Journal of Dermatological Science* 2017; 85(3):152–61. Available from: <http://www.sciencedirect.com/science/article/pii/S0923181116308167>
6. Power MC, Adar SD, Yanosky JD, Weuve J. Exposure to air pollution as a potential contributor to cognitive function, cognitive decline, brain imaging, and dementia: A systematic review of epidemiologic research. *Neuro Toxicology* 2016; 56:235–53. Available from: <http://www.sciencedirect.com/science/article/pii/S0161813X1630105X>
7. Suades-González E, Gascon M, Guxens M, Sunyer J. Air Pollution and Neuropsychological Development: A Review of the Latest Evidence. *Endocrinology* 2015; 156(10):3473–82. Available from: <https://academic.oup.com/endo/article/156/10/3473/2422751>
8. Progress cleaning the air and improving people's health. Washington, DC: Environmental Protection Agency, 2017 (<https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health>).
9. National Acid Precipitation Assessment Program report to Congress: an integrated assessment. Washington, DC: National Science and Technology Council, 2005.
10. According to a September 2017 story from the U.S. Energy Information Administration tracking the installation of mercury control technology on coal-fired power plants. This file shows that the compliance deadlines were extended to a few plants, but as of April 2017, all should have had controls in place. It includes a graph showing progress in the installation of controls and other details about the reduced mercury emissions. [Coal plants installed mercury controls to meet compliance deadlines](#).
11. U.S. Environmental Protection Agency (EPA), 2019, Tri National Analysis. [Mercury Air Releases Trend](#).
12. U.S. Environmental Protection Agency (EPA), 2011, Mercury and Air Toxics Standards: [Healthier Americans](#).
13. Gauderman WJ, Urman R, Avol E, et al. Association of improved air quality with lung development in children. *N Engl J Med* 2015; 372: 905–13.
14. US Environmental Protection Agency: Office of Air and Radiation. The benefits and costs of the Clean Air Act from 1990 to 2020. April 2011. https://www.epa.gov/sites/production/files/2015-07/documents/fullreport_rev_a.pdf (accessed March 30, 2017).

15. I6. Grosse SD, Matte TD, Schwartz J, Jackson RJ. Economic gains resulting from the reduction in children's exposure to lead in the United States. *Environ Health Perspect* 2002; 110: 563–69.
17. Pirkle JL, Kaufmann RB, Brody DJ, Hickman T, Gunter EW, Paschal DC. Exposure of the U.S. population to lead, 1991–1994. *Environ Health Perspect* 1998; 106: 745–50.
18. Annett JL, Pirkle JL, Makuc D, Neese JW, Bayse DD, Kovar MG. Chronological trend in blood lead levels between 1976 and 1980. *N Engl J Med* 1983; 308: 1373–77.
19. Shabecoff, Philip: EPA Chief Assailed on Lead Violation, *New York Times*, April 13, 1982.

Ms. DEGETTE. Thank you very much.

The Chair is now pleased to recognize Mr. Gustafson for 5 minutes.

STATEMENT OF ADAM R. F. GUSTAFSON

Mr. GUSTAFSON. Thank you, Chair DeGette, for inviting me to speak about EPA's proposed reconsideration of the mercury rule supplemental findings.

The EPA's proposal represents an important course correction in the Agency's accounting of the costs and benefits of environmental regulation. EPA is correct that it should not give equal weight to incidental reductions of pollutants like particulate matter that could not legally be regulated under the same statutory regime as mercury. The 2012 mercury rule is one in a series of expensive rules that EPA cost-justified on the basis of cobenefits from incidental reductions of PM, even though PM is not the object of those regulations and is already regulated under different provisions of the Clean Air Act that govern criteria pollutants.

Out of \$37 billion to \$90 billion in projected annual benefits, more than 99 percent came from the mercury rule's projected PM effects. PM reductions are the gift that regulators keep regifting. In the last administration, most of the benefits of Federal regulation came from PM-related cobenefits. In *Michigan v. EPA*, the Supreme Court agreed with the rule's challengers that EPA had to consider costs in determining whether the rule was appropriate. The Supreme Court did not decide whether EPA could rely on cobenefits. But that question was lurking in the background.

At oral argument, Chief Justice Roberts noted, quote, "It's a good thing if your regulation also benefits in other ways. But when it's such a disproportion, you begin to wonder whether it's an illegitimate way of avoiding the quite different limitations on EPA that apply in the criteria program," end quote.

EPA is now in litigation over the Obama administration's supplemental finding, which relies on PM cobenefits to justify the mercury rule. When the Trump administration took office, EPA had to decide whether to defend that finding or redo it.

Today, I want to explain why EPA's proposed revision is required by statute and also why it is necessary to rationalize EPA's cost-benefit analysis.

First, the Obama EPA's use of PM cobenefits to justify the mercury rule violates an express prohibition on regulating PM and other criteria pollutants under section 112, the statute that governs mercury and other hazardous air pollutants, or HAPS.

If you want to know what pollutants really motivated the mercury rule, consider that 95 percent of its PM cobenefits but none of the direct benefits came from controls on acid gas emissions. By justifying a HAP rule on the basis of PM cobenefits, the Agency sidestepped the prohibition on regulating PM under section 112.

This is not just a technicality. Congress intended criteria pollutants to be regulated under an entirely different framework that put States, not EPA, in the driver's seat. After EPA sets a National Ambient Air Quality Standard, it's the States that get to decide how to implement it. By using PM cobenefits to justify the rule, the

Obama EPA substituted its judgment for the State's judgment about the best way to regulate PM.

Even if the Clean Air Act had nothing to say about it, EPA's new proposal would be necessary to correct its arbitrary accounting of PM cobenefits. The EPA's air quality standard already requires States to reduce PM concentrations to the level that EPA deems, quote, "requisite to protect the public health with an adequate margin of safety." Yet the Obama EPA counted PM cobenefits both above and below the levels of the PM standard. The benefits of attaining the PM standard were accounted for when EPA set that standard in the first place. Treating those reductions as cobenefits of the MATS rule amounts to double counting.

Belts and suspenders each keep one's pants up. But wearing both at the same time does not yield twice the benefit. As for incidental PM reductions in areas that have already attained the PM standard, the Obama EPA unreasonably treated them as equally beneficial to reductions above the standard. That makes no sense.

Less than a year after the mercury rule, EPA set a PM standard of 12 micrograms because that level was somewhat below the concentration shown by certain key studies to cause adverse health effects. Reducing PM below that level cannot possibly yield the same degree of health benefits as reductions in noncompliant areas.

In conclusion, EPA's proposed reconsideration of the mercury rule's cost-benefit analysis is necessary to give effect to the Supreme Court's instruction in *Michigan v. EPA* and to the cooperative federalism framework that Congress established in the Clean Air Act. Following this approach in future rulemakings would avoid reporting an illusory or duplicative benefits and would help to rationalize EPA's air quality regulation.

I welcome your questions.

[The prepared statement of Mr. Gustafson follows:]

**Hearing Before the U.S. House of Representatives
Committee On Energy & Commerce
Subcommittee On Oversight and Investigations**

“Undermining Mercury Protections: EPA Endangers Human Health and the Environment”

Statement of Adam R.F. Gustafson¹

May 21, 2019

Thank you, Chair DeGette and Ranking Member Walden, for inviting me here today to speak to the Subcommittee about the Trump Administration’s reconsideration of EPA’s Supplemental Finding on whether the Obama Administration’s Mercury Rule is “appropriate and necessary.” EPA’s new proposal represents an important course correction in the Agency’s accounting of the costs and benefits of environmental regulation. EPA now proposes that the cost-benefit analysis that determines whether the Mercury Rule is “appropriate and necessary” under section 112 of the Clean Air Act, should not give equal weight to ancillary benefits (or “co-benefits”) caused by incidental reductions of pollutants like particulate matter (“PM”) that could not legally be regulated under

¹ This testimony draws from my previous publications on this subject and from comments on the Clean Power Plan drafted by Boyden Gray & Associates PLLC for the National Federation of Independent Business. See Adam Gustafson, EPA Reconsiders its Use of Co-Benefits in Cost-Benefit Analysis, Federalist Society Blog, Jan. 16, 2019, <http://bit.ly/2QdyPBn>; Daniel Farber & Adam Gustafson, Re-Considering Co-Benefits in Environmental Regulation, Federalist Society Teleforum (Mar. 29, 2019), <http://bit.ly/2Q9VKhf>; National Federation of Independent Business, Comments on Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, EPA-HQ-OAR-2013-0602-22962 (Dec. 1, 2014), <http://bit.ly/2Qa0TsV>.

the same statutory regime as mercury. The Agency's new approach is eminently reasonable as a policy matter, and it is consistent with the text of the statute.

Indeed, the Agency's former methodology, which is the subject of pending litigation, will be legally vulnerable unless EPA finalizes its new approach. The Obama Administration's 2016 supplemental fact finding, which EPA is now reconsidering, violates Section 112's prohibition on regulating criteria pollutants,² and it violates the statute's instruction to determine appropriateness of HAP regulation for coal-fired power plants only "after imposition of the requirements of this chapter."³ A court could also conclude that the Obama Administration arbitrarily and capriciously double-counted and over-counted PM reductions that had already been captured by other rules. In particular, EPA's national ambient air quality standard ("NAAQS") already controls PM_{2.5} to the degree EPA deems "requisite to protect the public health" with "an adequate margin of safety."⁴ And because the States are principally responsible for implementing that standard, EPA's treatment of PM reductions as co-benefits of its HAP regulation violates the cooperative federalism framework that Congress intended for the regulation of criteria pollutants.⁵

² 42 U.S.C. § 7412(b)(2).

³ *Id.* § 7412(n)(1)(A).

⁴ *Id.* § 7409(b)(1). "PM_{2.5}" is particulate matter with a diameter of 2.5 microns or less.

⁵ *See id.* § 7410(a).

By ceasing to rely on PM co-benefits to justify HAP regulation, EPA's new proposal takes an important step toward rationalizing future air quality regulation without actually altering the mercury standard itself. Existing coal-fired power plants have already complied with the standard, so there would be nothing to gain from rescinding the Mercury Rule today. And under binding D.C. Circuit case law, the Agency may only "de-list" a source of HAP emissions if a stringent statutory test is met and a demanding procedure is followed.⁶ EPA has not initiated that procedure, and the test likely cannot be met.⁷ Nevertheless, recognizing that criteria pollutant co-benefits are irrelevant to the Section 112 appropriateness determination could spark needed reforms of EPA's cost-benefit analyses in other areas.

I. Background

A. Particulate Matter Co-benefits Dominate Cost-Benefit Analyses in Support of EPA's Regulations.

The Obama Administration's Mercury Rule was one in a series of major environmental rules that EPA cost-justified on the basis of co-benefits from incidental reductions of particulate matter—a "criteria pollutant" that is already regulated under section 108, 109, and 110 of the Clean Air Act.

⁶ *New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008).

⁷ 42 U.S.C. § 7412(c)(9).

A 2011 study of all of the available Regulatory Impact Analyses (RIAs) for Clean Air Act regulations since 1997 (when EPA issued the first national ambient air quality standard (NAAQS) for PM_{2.5}) found that in most RIAs “a majority of [the] benefits—sometimes *all* of them—are from reductions in PM_{2.5},” even when the rules themselves do not target PM.⁸ And “a trend toward almost complete reliance of PM_{2.5}-related health co-benefits has grown over time.”⁹ EPA’s generous use of co-benefits has enabled more costly regulation; or—perhaps more accurately—increasingly costly environmental regulations have required ever loftier co-benefit claims.¹⁰

B. EPA’s Mercury Rule Became a Test Case for Co-Benefits.

As part of the trend toward near-exclusive reliance on PM_{2.5}-related co-benefits, the Mercury Rule is especially important. For some environmental regulations, cost-benefit analysis is only required by Executive Order; it has no independent significance outside the Executive branch.¹¹ But HAP regulation is

⁸ ANNE E. SMITH, NERA ECONOMIC CONSULTING, AN EVALUATION OF THE PM_{2.5} HEALTH BENEFITS ESTIMATES IN REGULATORY IMPACT ANALYSES FOR RECENT AIR REGULATION 7 (2011).

⁹ *Id.*

¹⁰ See C. Boyden Gray, *EPA’s Use of Co-Benefits*, ENGAGE (Sept. 24, 2015) (“Faced with the staggering costs of regulation and the requirement of cost-benefit analysis, EPA is under considerable pressure to identify corresponding benefits to outweigh the costs. That is where co-benefits come in.”).

¹¹ See Executive Order 12,866, 58 Fed. Reg. 51,735 (Oct. 4, 1993).

different after *Michigan v. EPA*, in which the Supreme Court held that costs and benefits are relevant to the question whether regulation is “appropriate and necessary” in the first place.

The case began in the U.S. Court of Appeals for the D.C. Circuit where State and industry petitioners were challenging the Mercury Rule based on—among other grounds—EPA’s refusal to consider costs when it decided to regulate HAP emissions from coal-fired power plants. The D.C. Circuit upheld the Rule in 2014, but then-Judge Kavanaugh dissented in part. He said it was “just common sense and sound government practice” that EPA should consider benefits and costs in deciding “whether it is ‘appropriate’ to go forward with the regulation.”¹² That “key statutory term” came from Section 112(n), which requires EPA to determine whether regulation of coal-fired power plants is “appropriate and necessary after considering the results of [a] study” of the residual health hazards of HAP emissions from power plants “after imposition of the requirements of this chapter.”¹³ Judge Kavanaugh would have held that “[i]t is entirely unreasonable for EPA to exclude consideration of costs in determining whether it is ‘appropriate’ to regulate electric utilities under the MACT

¹² *White Stallion Energy Ctr., LLC v. EPA*, 748 F.3d 1222, 1258–59 (D.C. Cir. 2014) (Kavanaugh, J., dissenting), *rev’d sub nom. Michigan v. EPA*, 135 S. Ct. 2699 (2015).

¹³ 42 U.S.C. § 7412(n)(1)(A).

program.”¹⁴ Although he had no occasion to rule on it, Judge Kavanaugh flagged the co-benefits question, noting that unless indirect PM_{2.5} benefits are included, “the Rule costs nearly \$1,500 for every \$1 of health and environmental benefit produced.”¹⁵

When the case reached the Supreme Court, Chief Justice Roberts probed the co-benefits question at oral argument: “It’s a good thing if your regulation also benefits in other ways,” he said. “But when it’s such a disproportion, you begin to wonder whether it’s an illegitimate way of avoiding the different—quite different limitations on EPA that apply in the criteria program.”¹⁶

Ultimately the Court did not decide whether EPA could rely on co-benefits to justify the Mercury Rule, because the Agency had eschewed any cost-benefit analysis at all when it decided to regulate mercury emissions from power plants. Justice Scalia’s opinion for the Court sided with Judge Kavanaugh. It held that ignoring costs was improper, because the statute required EPA to set “appropriate and necessary” standards. And it is not “rational, never mind ‘appropriate,’ to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits.”¹⁷ The Court expressly reserved the

¹⁴ 748 F.3d at 1261.

¹⁵ *Id.* at 1263.

¹⁶ Transcript of Oral Argument, *Michigan v. EPA*, No. 14–46 (Mar. 25, 2015).

¹⁷ *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015).

question whether “the Agency *could* have considered ancillary benefits when deciding whether regulation is appropriate and necessary.”¹⁸

On remand, the Obama EPA issued a new “appropriate and necessary” determination—this time considering costs. EPA’s 2016 Supplemental Finding adopted a “cost reasonableness” methodology as its “preferred approach” to the appropriateness analysis.¹⁹ Under this approach, EPA concluded that “the cost of MATS is reasonable,” because compliance costs are “well within the range of historical variability” and that “the power sector is able to comply with the rule’s requirements while maintaining its ability to perform its primary and unique function—the generation, transmission, and distribution of reliable electricity at reasonable cost to consumers.”²⁰

As an alternative approach, EPA’s 2016 Supplemental Finding adopted a traditional cost-benefit analysis and concluded that the Mercury Rule’s benefits (including PM_{2.5} co-benefits) would outweigh its compliance costs.²¹

¹⁸ *Id.* at 2711.

¹⁹ *Supplemental Finding That It Is Appropriate and Necessary To Regulate Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units*, 81 Fed. Reg. 24,420, 24,420 (Apr. 25, 2016).

²⁰ *Id.*

²¹ *Id.*

Several State and industry petitioners challenged the Obama Administration's new "appropriateness" determination in the D.C. Circuit.²² Following the 2016 presidential election, the Trump Administration sought and obtained an order holding the litigation in abeyance while EPA reviewed the 2016 Supplemental Finding.²³

Instead of defending the former Administration's Supplemental Finding in court, EPA issued a proposed reconsideration of the supplemental finding in February 2019.²⁴ EPA now "propose[s]" to find that the EPA's equal reliance on the particulate matter (PM) air quality co-benefits projected to occur as a result of the reductions in HAP was flawed[,] as the focus of CAA section 112(n)(1)(A) is HAP emissions reductions."²⁵ When EPA amended its analysis to remove consideration of co-benefit pollutants that the Agency already controls under different regulations, the benefits of the Mercury Rule fall significantly short of its acknowledged costs. Thus, "EPA proposes to conclude that it is not appropriate and necessary to regulate HAP from [electric generating units]"

²² *Murray Energy v. EPA*, No. 16-1127 (D.C. Cir.).

²³ Order, *Murray Energy*, No. 16-1127 (D.C. Cir. Apr. 27, 2017).

²⁴ *National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review*, 84 Fed. Reg. 2679 (Feb. 7, 2019). The comment period closed April 17, 2019.

²⁵ *Id.* at 2675–76.

under CAA section 112 because the costs of such regulation grossly outweigh the HAP benefits.”²⁶

EPA emphasized that its proposed factual finding that the Mercury Rule is not “appropriate and necessary” will not alter the regulatory environment: “finalizing this replacement will not remove the Coal- and Oil-Fired EGU source category from the CAA section 112(c)(1) list, nor will finalizing this revision otherwise affect the existing CAA section 112(d) emissions standards promulgated in 2012.”²⁷ To do that, under controlling D.C. Circuit precedent, EPA would first have to “determine that the CAA section 112(c)(9) statutory criteria for delisting have been met.”²⁸ Those criteria would be difficult if not impossible to satisfy.²⁹ Thus, if the proposed finding is finalized, it “would not have the effect of removing EGUs from the CAA section 112(c)(1) source category list.”³⁰

²⁶ *Id.* at 2676.

²⁷ *Id.* at 2678.

²⁸ *Id.* (citing *New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008)).

²⁹ To de-list a source category in the case of a carcinogenic HAP, EPA must determine “that no source in the category . . . emits such hazardous air pollutants in quantities which may cause a lifetime risk of cancer greater than one in one million to the individual in the population who is most exposed to emissions of such pollutants from the source.” 42 U.S.C. § 7412(c)(9)(B)(i). In the case of a non-carcinogenic HAP, EPA must determine “that emissions from no source in the category . . . exceed a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effect will result from emissions from any source.” *Id.* § 7412(c)(9)(B)(ii).

³⁰ 2019 Reconsideration of Supplemental Finding, 84 Fed. Reg. at 2678.

II. EPA's Former Reliance on Co-Benefits To Justify the Mercury Rule Was Unlawful.

EPA should be commended for reconsidering the “appropriateness” determination, because the past Administration’s analysis was in legal jeopardy if the Chief Justice’s questions in *Michigan* are any indication.³¹ Although the MATS Rule was directed at reducing emissions of mercury and air toxics, most of the Rule’s projected benefits came from projected avoidance of premature mortalities through projected reductions of PM_{2.5}. This reliance on PM_{2.5}-related co-benefits to justify the Mercury Rule involved three distinct statutory defects.

First, EPA’s use of co-benefits to justify HAP regulation is in conflict with the provision of Section 112 that expressly excludes these pollutants from the scope of the statute’s delegation of rulemaking authority.

Second, the Obama Administration’s approach neglected the cooperative federalism framework that Congress established for criteria pollutants.

Third, counting as co-benefits emissions reductions that would be attained by other Clean Air Act programs violates Section 112’s requirement to evaluate the appropriateness of regulating coal-fired power plants only “after imposition of the requirements of this chapter.”³²

³¹ See *supra* note 16 and accompanying text.

³² 42 U.S.C. § 112(n)(1)(A).

A. Counting PM_{2.5} Reductions as Benefits of the Mercury Rule Violated the Statutory Prohibition on Regulating Criteria Pollutants Under Section 112.

Section 112 excludes regulation of NAAQS pollutants, like PM_{2.5} and ozone (also known as “criteria pollutants”). EPA may expand the list of “hazardous air pollutants” (HAPs) regulated under that section, but “no air pollutant which is listed under section [108(a)] may be added to the [section 112] list.”³³ The D.C. Circuit has explained that “[t]his prohibition extends of necessity not only to rules that literally list a criteria pollutant as a HAP but also to any rule that in effect treats a criteria pollutant as a HAP.”³⁴ PM_{2.5} appears on the list of criteria pollutants published under Section 108. There can be no dispute, therefore, that they are improper subjects for regulation under Section 112.

Although the Mercury Rule did not purport to regulate PM_{2.5} directly, the vast majority of the projected benefits calculated by the Obama Administration from reducing PM_{2.5}. Out of \$37 to \$90 *billion* in projected annual benefits, all but \$4 to \$6 *million* came from the projected PM_{2.5} effects of the rule.

Counting PM_{2.5} reductions as benefits of the Mercury Rule violates the statutory prohibition on regulating criteria pollutants through Section 112. Because sources of air pollution inevitably emit multiple pollutants

³³ 42 U.S.C. § 7412(b)(2).

³⁴ *Nat'l Lime Ass'n v. EPA*, 233 F.3d 625, 638 (D.C. Cir. 2000), *as amended on denial of reh'g* (Feb. 14, 2001).

indiscriminately, air pollution controls necessarily affect multiple pollutants. The only meaningful way to enforce the prohibition on regulating criteria pollutants through Section 112, therefore, is to exclude PM_{2.5} and other NAAQS pollutants from the determination of whether a Section 112 regulation's costs are "appropriate and necessary."

To cost-justify Section 112 rules on the basis of ancillary criteria pollutant reductions would be to allow the Agency to simply sidestep the statutory bar on regulating criteria pollutants. If the criteria pollutant co-benefits are treated on par with HAP benefits, the Agency can regulate criteria pollutants freely by purporting to regulate the HAPs that are emitted along with them, no matter how negligible—or even nonexistent—the HAP-related benefits of the rule may be.

That is precisely what occurred in the Obama Administration's Mercury and Air Toxics Standards. Although known colloquially as the "Mercury Rule," 95% of the Rule's projected benefits (in the form of PM_{2.5} co-benefits) came not from mercury controls but from controls ostensibly intended to reduce acid gas emissions.³⁵ The Agency imposed these controls on power plants, which

³⁵ Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards at 5-14, EPA-452/R-11-011 (Dec. 2011) ("[S]ulfate reductions contributed 95% of the health co-benefits of all PM_{2.5} components, with an additional 5% from direct PM_{2.5} reductions. . . . The SO₂ emission reductions are the main driver for the health co-benefits of this rule.").

accounted for half of the rule's compliance costs,³⁶ even though acid gases “are not known to cause cancer,” and even though none of EPA's case studies had identified “significant chronic non-cancer risks from acid gas emissions.”³⁷ In fact, EPA did not quantify *any* direct benefits from reducing acid gas emissions. But the charade of regulating acid gas, a HAP, allowed EPA to mandate controls for SO₂, which is a precursor to PM and a criteria pollutant in its own right. Even though SO₂ (and NO₂) regulation under Section 112 is explicitly prohibited,³⁸ EPA acknowledged that the flue gas desulfurization (FGD or “scrubber”) and selective catalytic reduction (SCR) technology that plants would have to adopt to comply with the acid gas standard had “SO₂ and NO_x reduction” as “their primary targets.”³⁹ Power plants can even comply with the acid gas standard using SO₂ levels as a proxy.⁴⁰ This suggests that the MATS Rule was an effort to control criteria pollutant emissions under the guise of HAPs regulation.

³⁶ EPA estimated that the scrubbers required to meet the standard for acid gases would cost about \$5 billion per year, or “approximately half of the \$10 billion price tag” for the MATS Rule. *What EPA's Utility MACT Rule Will Cost U.S. Consumers: Hearing Before the Subcommittee on Energy and Power of the House Committee on Energy & Commerce*, 112th Cong. 160 (Feb. 8, 2012) (statement of Anne E. Smith, Ph.D.), <https://www.govinfo.gov/content/pkg/CHRG-112hhrg76379/pdf/CHRG-112hhrg76379.pdf>.

³⁷ 76 Fed. Reg. at 25,016.

³⁸ 42 U.S.C. § 7412(b)(2).

³⁹ Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards at 3-9, EPA-452/R-11-011 (Dec. 2011); *see id.* at 2-9 (“SCR is primarily used for NO_x control.”).

⁴⁰ *See* 40 C.F.R. Part 63, subpart UUUUU, Table 2.

B. Counting Criteria Pollutant Co-Benefits in HAPs Regulation Violates Cooperative Federalism.

Congress had another good reason to prohibit the regulation of criteria pollutants under Section 112. The issue is not just that criteria pollutants are already regulated under Sections 108–110 but that they are regulated under an entirely different framework that gives States—not EPA—the primary responsibility to regulate. Although EPA sets the NAAQS under Section 109, it falls to the States in the first instance to implement those standards under Section 110 as they see best.

By using PM reductions as co-benefits, the Obama Administration silently amended the State Implementation Plans for the PM_{2.5} NAAQS to mandate PM reductions from coal-fired power plants instead of (or in addition to) whatever alternative PM_{2.5} controls the States have adopted.

The Obama Administration’s cost-benefit methodology defeated Congress’s intention to establish the NAAQS program and its cooperative federalism framework as the primary means by which criteria pollutants would be regulated.

C. The Statute Requires EPA To Take Account of Existing CAA Regulatory Regimes in its “Appropriate and Necessary” Determination.

The Obama Administration’s inclusion of PM co-benefits violates Section 112 in another way. Before EPA may regulate HAP emissions from coal-fired power plants (“electric utility steam generating units”), EPA must first “perform a

study of the hazards to public health” of the HAP emissions from such plants “after imposition of the requirements of this chapter.”⁴¹ EPA may regulate only if “such regulation is appropriate and necessary after considering the results of th[at] study.”⁴²

Thus, Section 112 requires EPA to factor in all of the other air quality regulation that is required by the Clean Air Act, before determining whether even more regulation of coal-fired power plants is “appropriate and necessary.” Particulate matter emissions from power plants are controlled by several existing air quality programs, including NAAQS (under Sections 108–110), federal standards of performance for new sources (under Section 111), new source review and prevention of significant deterioration (under Sections 160–169B), the regional haze program (under Section 169A), and the acid rain program (under Sections 401–416).

To comply with Section 112, EPA’s “appropriate and necessary” analysis must adopt a forward-looking baseline that includes the emissions reductions that will be achieved “after imposition of” these air quality programs. Counting PM reductions as co-benefits for HAP regulation under Section 112 ignores this requirement. In effect, the Obama Administration pretended that the Agency was

⁴¹ 42 U.S.C. § 7412(n)(1)(A).

⁴² *Id.*

writing on a blank slate with no other PM-related regulation in sight. Section 112 requires a more circumspect approach.

III. All PM_{2.5} Co-Benefits Result from Either Double-Counting Benefits Captured by the NAAQS or Over-Counting Insignificant Emissions Reductions.

In addition to its statutory defects, the Obama Administration's cost-benefit analysis was arbitrary and capricious in that it "include[d] benefits both above and below the levels of the [PM_{2.5}] NAAQS."⁴³ Regulating against the backdrop of the PM_{2.5} NAAQS, the asserted co-benefits were illegitimate, both above and below that the existing regulatory threshold.

First, the benefits of compliance with EPA's PM_{2.5} NAAQS were accounted for when EPA set the NAAQS in the first place, so treating them as co-benefits of the MATS Rule amounted to double-counting.

Second, EPA's reliance on incidental PM_{2.5} reductions also overstated the benefits of the proposed rule by valuing all emissions reductions equally, even in areas that have already attained the PM_{2.5} NAAQS, below which it is impossible to measure significant health effects.

By removing the PM_{2.5} co-benefits from the analysis, the Trump Administration corrects both of these problems.

⁴³ 2016 Supplemental Finding, 81 Fed. Reg. at 24,440.

A. PM_{2.5} Reductions Above 12.0 µg/m³ Are Mandated by the NAAQS, So Using them as Co-Benefits Amounts to Double-Counting.

It is for good reason that the Clean Air Act expressly excludes NAAQS pollutants from those that can be regulated under § 112. These pollutants are already regulated under Section 109 of the Act at a level EPA deems “requisite to protect the public health” with “an adequate margin of safety.”⁴⁴ Under the 2013 PM_{2.5} NAAQS, the States are held to a 12.0 µg/m³ standard.⁴⁵ The benefits of reducing PM_{2.5} emissions to this level have already been quantified and used to justify EPA’s costly NAAQS regulations.

By counting the effects of reducing PM_{2.5} to the level already required by the NAAQS, the Obama Administration was improperly double-counting those benefits to justify two sets of regulations.⁴⁶ This methodology would allow an agency to cost-justify duplicative regulations aimed at addressing a single problem even though their combined costs outweigh the common benefit they

⁴⁴ 42 U.S.C. § 7409(b)(1).

⁴⁵ *National Ambient Air Quality Standards for Particulate Matter*, 78 Fed. Reg. 3,086 (Jan. 15, 2013).

⁴⁶ See Michael A. Livermore & Richard L. Revesz, *Rethinking Health-Based Environmental Standards*, 89 N.Y.U. L. Rev. 1184, 1267 note 347 (2014) (“To guard against double counting the ancillary benefits, one needs to make sure that after each regulation is promulgated, a new baseline level of pollution is computed. Then, the further benefits from subsequent regulations need to be determined by reference to this baseline.”).

both hope to achieve. The benefits of achieving the NAAQS standards cannot rationally be counted as benefits of other rules.

B. $PM_{2.5}$ Reductions Below the NAAQS Are Insignificant.

In addition to counting benefits from $PM_{2.5}$ reductions already mandated by the relevant NAAQS, the Obama Administration's cost-benefit analysis also "include[d] benefits of reductions in air pollution at levels below the NAAQS."⁴⁷ Specifically, the 2016 Supplemental Finding defended "log-linear, no-threshold concentration-response functions," meaning that anticipated $PM_{2.5}$ reductions in high-concentration areas were given the same weight as reductions in low-concentration areas, all the way down to zero. This methodology is contrary to the NAAQS regulation's premise that $PM_{2.5}$ emissions below the level of the NAAQS are inconsequential.

The NAAQS represent the level of pollution control that EPA deems "requisite to protect the public health" with "an adequate margin of safety."⁴⁸ Reducing $PM_{2.5}$ emissions even further is not "requisite to protect the public health," and therefore cannot possibly produce the same degree of health benefits as reductions above the NAAQS. As a former Chairman of the Texas Commission on Environmental Quality has explained,

⁴⁷ 2016 Supplemental Finding, 81 Fed. Reg. at 24,440.

⁴⁸ 42 U.S.C. § 7409(b)(1).

If reducing particulate matter had the enormous benefits that EPA's analysis claims, it has a legal responsibility to lower the national ambient standard to a level that is actually protective of human health. The fact that it has not done so suggests that the EPA does not really believe its own numbers. The EPA set the new NAAQS for annual PM_{2.5} at 12 µg/m³, an ambient level still far above the lowest measured levels (LMLs) that the EPA used to identify risk of death in cost-benefit analyses. . . . This . . . gives a misleading picture of the relative costs and benefits of EPA regulations.⁴⁹

EPA's newly proposed finding alludes to this problem in a memorandum to the docket. It cites "uncertainties . . . regarding the relationship between PM_{2.5} exposure and the risk of premature death at low PM_{2.5} concentrations."⁵⁰ It goes on to say that "[t]hese uncertainties are particularly important because air quality has improved over time . . . reducing the fraction of the U.S. population experiencing elevated PM_{2.5} exposures."⁵¹ These concerns are well founded, and they justify EPA's decision not to count below-NAAQS PM_{2.5} co-benefits in its appropriateness determination.

The Obama Administration's assumption, for purposes of the Mercury Rule, that the health impact function for PM_{2.5} is log-linear without a threshold violates the best available science on which EPA relied when it updated the PM_{2.5}

⁴⁹ Kathleen Hartnett White & Josiah Neeley, *Who Regulates the Regulator?: Cost-Effectiveness Analysis in Texas State Agency Rulemaking*, 14 TEX. TECH. ADMIN. L.J. 401, 412 (2013).

⁵⁰ Memorandum to Docket for *National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review* 4, EPA-HQ-OAR-2018-0794 (Dec. 14, 2018).

⁵¹ *Id.*

NAAQS in 2013—less than one year after the Mercury Rule.⁵² In the NAAQS rulemaking, the Agency selected a threshold of 12.0 µg/m³ because “it was somewhat below the lowest long-term mean concentration shown by certain key epidemiologic studies to cause adverse health effects.”⁵³ By counting PM_{2.5} reductions in areas that are already in attainment with the NAAQS, down to zero, the Obama Administration assigned mortality-avoidance benefits to reducing PM_{2.5} below the level at which that pollutant has a measurable effect on mortality.

In the PM_{2.5} NAAQS Rule, EPA explicitly considered and rejected proposals to mandate lower levels of PM_{2.5}, because “a standard set at a lower level would not be warranted to provide requisite protection that is neither more nor less than needed to provide an adequate margin of safety.”⁵⁴ In setting the NAAQS, EPA found that the limited evidence of PM_{2.5}’s contribution to adverse health effects at low concentrations “does not justify” a more stringent standard.⁵⁵

⁵² 78 Fed. Reg. 3,086 (Jan. 15, 2013).

⁵³ *Nat’l Ass’n of Mfrs. v. EPA*, 750 F.3d 921, 924 (D.C. Cir. 2014) (citing 78 Fed. Reg. 3086, 3158–59, 3161 (Jan. 1, 2013)).

⁵⁴ 78 Fed. Reg. at 3,161.

⁵⁵ See *id.* at 3162 (“[T]he available evidence interpreted in light of the remaining uncertainties does not justify a standard level set below 12 µg/m³ as necessary to protect public health with an adequate margin of safety.”); *id.* (“[A] lower annual standard level . . . would reflect placing essentially as much weight on the relatively more limited data providing evidence suggestive of a causal relationship for effects observed in some at-risk populations (e.g., low birth weight) as on more certain evidence of effects classified as having a causal or likely causal relationship with PM_{2.5} exposures. In the Administrator’s view, while it is important to place some weight on such suggestive evidence, it would not be appropriate to place as much weight on it as the commenters would do. . . . [U]sing this type of information to set a standard level of 11 µg/m³ or below would assume too high a degree of confidence in

In attempting to cost-justify the Mercury Rule, the Obama Administration ignored these findings and treated all emissions reductions alike, whether or not they occur below the NAAQS level. This unjustified methodological change between the PM_{2.5} NAAQS and the 2016 Supplemental Finding is arbitrary and capricious.

IV. The Obama Administration Omitted Corresponding Ancillary Costs from its Cost-Benefit Analysis.

Even if EPA's 2016 appropriate and necessary determination had properly considered PM reductions as ancillary benefits, the cost-benefit analysis would have been flawed because it omitted corresponding ancillary costs. The Agency considered the direct compliance costs to industry, but it neglected the other societal effects of the Mercury Rule. Mandating costly control technology on power plants presumably raised energy prices and forced some plants to close down. Increased prices and forced closures have ancillary effects on the

the magnitude and significance of the associations observed in the lower part of the distributions of health events observed in these studies."); *see also id.* at 3158 ("[I]n the absence of any discernible population-level thresholds" for any health effect based on the currently available evidence "it is appropriate to consider the relative degree of confidence in the magnitude and significance of the associations observed in epidemiological studies across the range of long-term PM_{2.5} concentrations in [the relevant] studies."); *id.* ("[T]he Administrator deems it reasonable not to draw further inferences from air quality and health event data in the lower part of the distribution."); *id.* ("[T]here is significantly greater confidence in the magnitude and significance of observed associations for the part of the air quality distribution corresponding to where the bulk of the health events evaluated in each study have been observed, generally at and around the long-term mean concentrations.").

economy—increased production costs, reduced discretionary income, foregone healthcare, unemployment, etc.

A balanced cost-benefit analysis would have taken such “co-costs” into account to the same extent it considered co-benefits. The Obama Administration’s omission of ancillary costs from its analysis is another justification for the Trump Administration’s decision to exclude PM co-benefits from its “appropriate and necessary” analysis.

V. Unlimited Accounting of Co-Benefits Tends to Justify Unjustifiable Regulations and Misinform the Public.

The point of cost-benefit analysis is to ensure that regulations are efficient. Including incidental reductions of emission of non-target pollutants (especially where those non-target pollutants are directly regulated by separate rules) undermines efficient regulation, because it fails to consider whether the non-target pollutant may be regulated more efficiently by different means.⁵⁶ In the case of PM_{2.5}, EPA has already determined that an “annual standard is the most effective and efficient way to reduce total population risk associated with both long- and short-term PM_{2.5} exposures.”⁵⁷

⁵⁶ See Anne E. Smith, NERA Economic Consulting, *An Evaluation of the PM_{2.5} Health Benefits Estimates in Regulatory Impact Analyses for Recent Air Regulations* (2011).

⁵⁷ 78 Fed. Reg. at 3,163.

Including co-benefits obscures the impact of the rule on the targeted pollutants (mercury and air toxics) and hinders both the public's ability to understand the Agency's policies and to hold the Agency accountable for those policies.

CONCLUSION

EPA's proposed reconsideration of the Obama Administration's supplemental finding on the appropriateness of the Mercury Rule is not just sound policy, it is a necessary response—in the context of pending litigation—to the Supreme Court's remand in *Michigan* and its holding that a rule must be cost-justified to be "appropriate." Because criteria pollutants like PM are not a proper object of HAP regulation under Section 112, and because the benefits of reducing PM_{2.5} have already been captured by the NAAQS, EPA has done well to reconsider the past Administration's over-reliance on co-benefits. EPA should take a similar approach to future regulatory actions that require or permit consideration of cost. To give effect to Congress's cooperative federalism framework for criteria pollutants and to avoid illusory or duplicative benefit, such actions should not count ancillary reductions of PM_{2.5} and other criteria pollutants as co-benefits.

Thank you, again, for the opportunity to testify on this important issue. I welcome your questions.

Ms. DEGETTE. Thank you so much, Mr. Gustafson.

The Chair now recognizes herself for 5 minutes for questioning.

Ms. McCabe, the MATS rule is the first time the EPA has successfully protected the public from mercury release from power plants. And at Congress' direction, the EPA studied this issue in the 1990s, and then it took steps to develop the mercury standards for power plants as far back as 2000. Is that correct?

Ms. MCCABE. Yes.

Ms. DEGETTE. And, Ms. McTeer Toney, I understand that the EPA's current mercury and air toxic standards, which were finalized in 2012, now provide critical public health protections for fence-line communities near power plants, which are often low-wealth communities. Is that right?

Ms. MCTEER TONEY. Yes, ma'am.

Ms. DEGETTE. And I will say, I was just telling Mr. Guthrie, we have one of these communities right in my congressional district, Swansea-Elyria and Globeville, where we actually had to go in and remove mercury from the yards of the homes there.

Dr. Landrigan, I want to ask you: We know that mercury emissions can carry enormous public health consequences, as you talked about children and pregnant women. And I think that what you said is that these babies that are born after being exposed can suffer IQ and motor skills impairments that will really last a lifetime. They don't go away. Is that right?

Dr. LANDRIGAN. That is correct, ma'am.

Ms. DEGETTE. And back to you, Ms. McCabe.

As of today, the industry has actually spent billions of dollars to come into compliance with these rules and, in fact, that the power industry, what we heard is that they support keeping the rule in place. Is that also correct?

Ms. MCCABE. Yes. That's my understanding.

Ms. DEGETTE. OK. Dr. Selin, a recent study—thank you for your excellent analysis. I thought it was terrific. And recent studies have suggested the direct benefits of protecting against mercury may be actually much higher than the ones quantified by the EPA. And, in fact, you found that the direct monetized benefits of mercury protection might be 3.7 billion more per year. And I think you said that's many more times than the EPA found in 2011. Is that right?

Dr. SELIN. That's correct.

Ms. DEGETTE. And that's the direct benefits.

Dr. SELIN. Yes.

Ms. DEGETTE. OK. Now, Mr. Livermore, you said in your testimony that the Obama EPA's finding was extremely well justified in cost-benefit terms. Is that right?

Mr. LIVERMORE. Absolutely.

Ms. DEGETTE. And you also said, regarding the Trump EPA's proposal and methodology, it's, quote, "contradicting the relevant guidance and decades of practice by both political parties" and results in, quote, "a biased and misleading estimate" of cost and benefit.

Could you please elaborate on that?

Mr. LIVERMORE. Well, you know, the purpose of cost-benefit analysis is to understand the consequences of an agency decision. And

by excluding a large category of consequences, it's just functionally inconsistent with that goal. It's just kind of turning a blind eye to an enormous category of consequences. Here we're talking about thousands of lives being saved. They have quantified benefits of, you know, many billions of dollars. Tens of billions of dollars.

So, if the goal of cost-benefit analysis is to get a clear picture of what the consequences of a decision are, blocking off a big chunk of the picture is just not how you do that.

Ms. DEGETTE. OK. Now, Ms. McTeer Toney, can you—you really talked about the EPA and how they're the ones to blame for this. Can you elaborate on that a little bit more?

Ms. McTEER TONEY. So the fact that the EPA is reconsidering—or weakening this proposal is unnecessary. They use the term “appropriate and unnecessary” in terms of challenging the *Michigan* decision when the reality is there's no need for them to do so. The decision was currently in the hands of the Court. And the Obama administration did respond.

But it was the Trump administration's EPA that decided to put that into abeyance and not defend it. And so, as a result, there's a decision that's being made that's completely and totally unnecessary.

The second part of that is that they are taking actions right now that would weaken the rule. They say they're not trying to do it, but at the same time, they're holding hearings, they're requesting comments, and doing things that, in the scope of practice at EPA, one would do if you're going to actually reconsider or move and change it.

Ms. DEGETTE. So, if their intent was actually strengthen the rule, what would they do instead of what they're doing now?

Ms. McTEER TONEY. They would have allowed it to proceed to the court system. I believe the Obama-era supplemental decision would have been upheld. We don't know that because the Court hasn't made that decision. And then they would have looked into the communities and looked at working in States to determine what things they need to do to make the rule stronger.

Ms. DEGETTE. Thank you very much. I thank all of the witnesses, and I'd now like to recognize the ranking member for 5 minutes for purposes of questioning.

Mr. GUTHRIE. Thank you very much, and I thank all of the witnesses for being here, and Mr. Gustafson, I want to ask you a couple questions, focus on the way that Congress constructed the Clean Air Act, and obviously, Congress has the ability to change it if need be. And so it's my understanding that the Clean Air Act is designed to regulate hazardous air pollutants, such as mercury, and criteria pollutants, such as particulate matter, under different sections of the Clean Air Act.

In your testimony, you state the Obama administration's 2016 Supplemental Fact Finding, which EPA is now reconsidering, violates section 112's prohibition or regulating criteria pollutants and it violates the statute's instruction to determine appropriateness of HAP regulation for coal-fired plants only after imposition of the requirements of this chapter.

Can you explain what you mean by this and, based on your understanding of the Clean Air Act, what section of the act would be a more appropriate section to regulate criteria pollutants?

Mr. GUSTAFSON. Thank you, Ranking Member Guthrie. Yes, that's exactly right, the Clean Air Act does address all of the pollutants that have been discussed today, but the act does so under different provisions.

Particulate matter is one of the criteria pollutants that is regulated under sections 108, 109, and 110 of the Clean Air Act. The EPA identifies the criteria pollutants under 108; they set a standard under 109; and the States implement that standard with State implementation plans under section 110. That is why, under section 112, which governs mercury and other hazardous air pollutants, EPA is not permitted to regulate criteria pollutants like particulate matter.

In addition, as you mentioned, section 112 also requires EPA, before regulating hazardous air pollutants from coal-fired power plants, to first determine whether, in light of all of the other Clean Air Act regulation governing those sources, further regulation is "appropriate and necessary."

So the EPA is already required to accept as a baseline the existence of other regulation—the other regulation of PM—including the National Ambient Air Quality Standard. And the problem with the mercury rule adopted under the past administration was that it treated cobenefits, that is, reductions of particulate matter, as equivalent to reductions on pollutants that the Agency is allowed to regulate under section 112.

Mr. GUTHRIE. So the question isn't that these don't need to be regulated; of course, it's how they're regulated in accordance with the way Congress instructed the EPA. So Congress could change that instruction if we so—

Mr. GUSTAFSON. That's exactly right, and indeed, if the standard is not stringent enough, then EPA could set a new particulate matter standard. They did that last in 2013, not a year after the mercury rule was promulgated.

Mr. GUTHRIE. OK. Thanks. And your testimony further states that, because the States are principally responsible for implementing, the EPA's treatment of PM reductions as cobenefits of its HAP regulation violates the cooperative federalism framework. You talked about the federalism framework.

Can you elaborate on how this violates the cooperative federalism framework that was intended by Congress?

Mr. GUSTAFSON. Certainly. So, under section 110 of the Clean Air Act, States get to implement the standards for criteria pollutants like particulate matter. That means that they develop—the States develop an implementation plan. They get to decide what they think is the best way of addressing those pollutants given the circumstances on the ground within those States.

And, by the way, criteria pollutants, like particulate matter, come from a variety of sources. It's not only power plants that produce these pollutants. So States have a menu of options for reducing particulate matter. They can do that by imposing limits on power plants, but they can also do that by regulating other sources, including motor vehicles that produce PM.

So, basically, by treating cobenefits as the justification for this rule, the Obama administration usurped the State's prerogative to decide the best way to regulate criteria.

Mr. GUTHRIE. Similar question. So cobenefits are the major reason for this cost-benefit analysis, like 99 percent. So does this mean that utilities that are located in an area that is already in attainment, again, that there is—that is to mean the EPA deems safe standard—is being forced to achieve levels that—are the utilities in safe attained areas being forced to achieve levels below the standard?

Mr. GUSTAFSON. Yes, that's correct. The 2016 supplemental finding makes clear that the Agency's defending claimed PM cobenefits both above and below the National Ambient Air Quality Standard.

Mr. GUTHRIE. Thank you. My time's expired. I do have some—for the record, offers—I submitted a list. I could read the list or can I—

Ms. DEGETTE. You don't need to read it.

Mr. GUTHRIE. So the seven items that I submitted the list to the Chair would be accepted in the record?

Ms. DEGETTE. Yes. I just would point out, four of the five articles on your list—on the ranking member's list were written by the same person, Anne Smith, and I understand that she's a consultant for industry, but I will admit all of the items on the list without objection.

[The information appears at the conclusion of the hearing.¹]

Mr. GUTHRIE. OK. Thank you.

Ms. DEGETTE. The Chair's now pleased to recognize the vice chair of the Oversight Subcommittee, Mr. Kennedy, for 5 minutes.

Mr. KENNEDY. Thank you, Madam Chair. And apologies for being a little late at coming back.

According to the EPA's website, quote, "the mission of the EPA is to protect human health and the environment," end quote. That seems pretty straightforward, and yet here we are.

EPA's enforcement is declining, as we saw a few months ago in the subcommittee, and the EPA is failing to protect human health and the environment. Yet here we see EPA wasting enormous resources and energy in their effort to question whether it is "appropriate and necessary" to regulate mercury.

Ms. McTeer Toney, you said in your testimony that you—as you take EPA to task for diversion of resources and you write, quote: "Rather than revisiting these life-saving standards, EPA should be strengthening them to reduce hazardous air pollutants further from these sources, to better protect the health of children, families, and communities living near these facilities and downwind from them."

So, ma'am, do you consider EPA's current mercury proposal consistent with the mission statement, again, "to protect human health and the environment"?

Ms. McTEER TONEY. Yes, I do, but may I elaborate just about—

Mr. KENNEDY. Please.

¹Two NERA Economic Consulting reports and a Federal Register entry submitted by Mr. Guthrie have been retained in committee files and also are available at <https://docs.house.gov/Committee/Calendar/ByEvent.aspx?EventID=109556>.

Ms. McTEER TONEY. I think it's important also to note that how this works together is something that additionally helps communities to realize these benefits. It was mentioned before that the States have the opportunity to regulate through their own SIP, but they work together interchangeably. So the way that the States realize these benefits that help these communities is they are dependent upon the standards that are set by the Federal Government; that's how they make their decisions.

When we weaken and change those standards, it then weakens the States' abilities to make those decisions through their SIP programs, which in turn cost the State money, which in turn costs the people their health benefits.

So it all works together, and that's why it's so important for us to realize and why moms are so concerned is because we know this will hit us in our communities quicker than anywhere else.

Mr. KENNEDY. And so, Ms. McCabe, if you really wanted to protect human health and the environment in particular with regard to mercury and air toxics, what actions should the Agency be taking now?

Ms. MCCABE. Well, they wouldn't go forward with this proposal, that's for sure. They would look at other rules that—and other sources that are emitting pollution, whether it's toxic pollution or other pollution, in our communities and work to strengthen those rules.

It would help the States rather than—what they're doing now is pushing the responsibility onto the States and yet taking away the very programs that will help States meet their standards, like MATS, like the Clean Car Program.

States cannot regulate motor vehicles. The Clean Air Act requires that EPA do that. So they're saying that they're helping the States, but they're really not.

Mr. KENNEDY. And so, building off that, EPA seems to want to have it both ways, just as you indicated, so it wants to tell the public that they're trying to keep the mercury rule in its place but at the same time taking actions that would seem to undermine the very rule's foundation. True?

Ms. MCCABE. True.

Mr. KENNEDY. So EPA's attempt to undermine important toxic pollutant protections, unfortunately, as I think you had indicated, is not new. Back in the 1980s, there was an attempt by the EPA that was thankfully unsuccessful to roll back standards relating to keeping lead out of gasoline.

Dr. Landrigan, can you tell us more about the previous effort and what that teaches us about how we need to respond today with regards to the mercury protections?

Dr. LANDRIGAN. Well, the effort to take lead out of gasoline began in the early 1970s when pediatricians and various studies recognized that lead could cause damage to the brains of children at levels that were well below—standards that were well below the levels that were then considered to be safe.

And, in fact, the cycle has repeated itself several times since. As more and more sophisticated research has come along, we found harm at levels of exposure lower and lower and lower until, today,

the official statement of the Centers for Disease Control on lead and mercury is that no level of exposure is safe.

So, acting on that information, EPA mandated that lead be taken out of gasoline beginning in 1975. And as I mentioned in my testimony, that led to a 90 percent reduction in blood lead levels in American children, a 5-point gain in the IQ of every child born since 1980, and an estimated economic benefit to this country of \$200 billion in each annual class of children born since 1980, which is an aggregate benefit of close to 8 trillion, if my math is correct.

In 1982, in the Reagan administration, then-EPA Administrator Anne Gorsuch made a brief, ultimately unsuccessful attempt to put lead back into gasoline, reportedly acting at the request of a single refinery in New Mexico, but that was beaten back. And American children today enjoy blood levels less than 2 micrograms as opposed to the levels of close to 20 micrograms, which were the case 30 years ago.

Mr. KENNEDY. Thank you, sir.

I yield back.

Ms. DEGETTE. The Chair now recognizes Mr. Walden for 5 minutes.

Mr. WALDEN. Thank you, Madam Chair, and, again, thanks to the witnesses. As you can tell, we've got a couple hearings going on simultaneously, so we have to bounce back and forth.

Mr. Gustafson, in your testimony, you discuss concerns that both Chief Justice John Roberts and now Justice Kavanaugh raise regarding the heavy reliance on cobenefits to justify the MATS rule. Now, if a court is asked to decide whether such heavy reliance can be given to cobenefits to justify the mercury rule, what do you think is the likely outcome?

Mr. GUSTAFSON. Thank you for the question. I think there's a high likelihood that other Justices on the Supreme Court would share the skepticism that Chief Justice Roberts expressed in oral argument in the *Michigan* case about EPA's undue reliance on really disproportionate PM cobenefits to justify the mercury rule. So I think courts should be skeptical of that methodology.

Mr. WALDEN. So, in your testimony, you laid out how the reliance in the 2016 supplemental finding on cobenefits involves three distinct statutory defects. As one of the defects, you note that section 112 of the Clean Air Act expressly prohibits the EPA from adding an air pollutant which is listed under section 108, such as particulate matter, to the section 112 list. Now, if the EPA tried to directly regulate particulate matter under section 112, what do you think would be the likely outcome?

Mr. GUSTAFSON. That action would be clearly unlawful and would be rejected by a court.

Mr. WALDEN. All right. Thank you.

Ms. McCabe, in *Michigan v. EPA*, the Supreme Court ruled that the Agency must consider costs when determining whether or not it's "appropriate and necessary" to regulate power plants for hazardous air pollutants. The day after this ruling, June 30, 2015, the EPA issued a broad post saying, and I quote: "From the moment we learned of this decision, we were committed to ensuring that standards remain in place to protect the public from toxic emissions from coal- and oil-fired electric utilities," close quote.

Now, given the statement, what did the EPA believe was the purpose of the Supreme Court's decision in ruling that the EPA must consider cost when making the "appropriate and necessary" termination?

Ms. MCCABE. Yes. So, to clarify, the EPA did consider cost in the rulemaking. We did it in conjunction with the rule itself, not with the "appropriate and necessary" finding, and we had reasonable belief to think that that was not required. The DC circuit agreed. The Supreme Court disagreed, told us to use appropriate methods, left it to the EPA's discretion on how to do that cost analysis.

So we were confident, because the cost and benefit analysis had already been done, that the rule was well justified and ought to remain in place, and we're committed to moving forward to respond to the Court's direction to do that analysis in the context of the "appropriate and necessary" findings.

Mr. WALDEN. So, in your written statement today, you state that, and I quote: "Another significant flaw in EPA's approach is the fact that it is basing its revised analysis on a record that is demonstrably out of date," close quote.

Yet, in the 2016 supplemental finding, EPA responded to the commenters asking for updated cost estimates by stating that it was not, and I quote, "consistent with the statute," close quote, for the EPA to try to estimate the actual costs incurred through compliance with the final CAA section 112(d) standards, close quote.

If it was not consistent with the statute to use an updated cost estimate in 2016, why do you criticize the EPA's use of the original numbers today?

Ms. MCCABE. Well, these are very different circumstances. EPA was responding to a direct direction from the Supreme Court in that particular rulemaking. What the EPA is doing now is initiating sua sponte, on its own initiative, an inquiry and a change of approach. And in the meantime, a lot has happened in the world.

It can be determined how much the rule actually cost and it is expected to cost. And, as we've heard today, there's a lot more information and study about the benefits of mercury reduction.

Mr. WALDEN. So—thank you. In the blog post I referenced earlier in my questioning, the one that was issued the day after the Supreme Court ruled in *Michigan v. EPA*, the EPA stated the majority of the power plants are already in compliance or well on their way to compliance.

Given that this statement was made a year before the 2016 supplemental finding, didn't the Agency have updated cost information at that time too?

Ms. MCCABE. Well, no, we didn't.

Mr. WALDEN. You did not?

Ms. MCCABE. We did not. We did take comment on a proposed supplemental finding and looked at that information and actually made some adjustments in the final supplemental finding in response to that information.

Mr. WALDEN. All right. My time's expired. Thank you, ma'am.

Ms. DEGETTE. Thank you so much. The Chair now recognizes the gentleman from New York, Mr. Tonko, for 5 minutes.

Mr. TONKO. Thank you, Chairwoman DeGette and Ranking Member Guthrie for holding this hearing. I thank you for the part-

nership that you've had with the Environment Subcommittee, and together I believe we've been able to conduct oversight of EPA's efforts to undermine MATS and rollback of other Clean Air Act protections, which I think is a very important mission for us to pursue.

Mr. Livermore, the Trump EPA's current proposal is that it is no longer "appropriate and necessary" to regulate mercury while at the same time EPA is trying to convince the public that it is keeping the mercury rule in place. So was the Obama EPA using cost-benefit methodology correctly by counting the roughly \$90 billion in cobenefits that came along with regulating mercury?

Mr. LIVERMORE. Yes, absolutely, it was correct in the matter of economics and policy and also of all guidance that's relevant to the question.

Mr. TONKO. And now it seems that the Trump administration, by finding that it is no longer "appropriate and necessary" to regulate mercury, considers only the roughly \$6 million figure in benefits from mercury reductions, not the roughly 90 million—billion, excuse me, in cobenefits that came from reducing particulate matter.

Mr. Livermore, you disagree with this approach and say that it results in, and I quote, "a biased and misleading estimate of cost and benefits." However, it seems that EPA is suggesting that they are legally required to take their current approach. So do you believe the Trump EPA is legally required to exclude cobenefits in looking at the mercury rule?

Mr. LIVERMORE. Absolutely not. There are, again, decades of practice under various statutory provisions, some of which look very familiar to the one in question, the Agency's accounting for indirect benefits, including administrations—the Reagan and Bush—rulemakings under Reagan and Bush administrations. Again, there's decades of practice.

If Congress had wanted to make a change to make it clear that indirect benefits shouldn't be counted, plenty of time to do that. At no point was that done. *Michigan v. EPA*, if anything, stands for the proposition of agencies should be looking more expansively at cost and benefits and not less so.

Mr. TONKO. And, in fact, you state in your testimony that in light of years of agency practice, agencies should consider indirect costs and benefits when making regulatory decisions and that, again, quote, "departing from this well-established norm requires a very good reason."

So did the Trump EPA provide, quote, "a very good reason" for functionally dismissing cobenefits here from the calculation?

Mr. LIVERMORE. No, there isn't—it was a make wait reason at best. It doesn't distinguish other contexts where it counted indirect benefits. It doesn't limit the decision to this particular context. It's not clear when it's going to be applied in other contexts, and so the decisionmaking—the reason provided by the Agency was very weak.

Mr. TONKO. And you say that, if the current EPA mercury proposal is finalized and adopted, it would be, and I quote, "opening the door to the flagrant manipulation of cost-benefit analysis."

Mr. Livermore, can you elaborate on the risks of the Trump administration's new approach to future rulemaking?

Mr. LIVERMORE. Yes. So indirect benefits can be an important class of benefits, and so, if the decision in this case were applied across the board, it would just lead to gross inefficiencies in our environmental protection system. Almost more dangerously is that the Agency could kind of pick and choose—or any agency, for that matter—when it wanted to look at indirect benefits or not, or which indirect benefits it wanted to look at or indirect costs, for that matter. And if that's the case, then the entire purpose of cost-benefit analysis goes out the window, because agencies can just provide post-hoc rationalizations for decisions that are arrived on political grounds.

Mr. TONKO. Well, I thank you for your answers. The Trump EPA's misguided approach ignores billions of dollars in benefits that come from avoided premature deaths, heart attacks, asthma attacks, and more.

Revising the cost-benefit calculation is not simply an academic exercise. What we have here are peoples' lives and health being at stake, and is it double counting to consider outside benefits?

Mr. LIVERMORE. No. There's various claims about double counting that none of them—none of them stand up. A question that's come up is counting benefits below the NAAQS. So the National Ambient Air Quality Standards are set across the country, they're set according to a cost-blind standard. They're not set, and the EPA's never said that they are set, at a zero-risk standard, and so the idea that there are no benefits below the NAAQS is just nonscientific, and it's not—the Agency has never said it, and so it's entirely appropriate for the Agency to count those benefits.

So the short answer is no, there's no double counting this rule. And actually the Agency is very fastidious about avoiding double counting, and it hasn't done so in this case.

Mr. TONKO. I very much appreciate your answers, and, again, this is about protecting the peoples' health and our environment. So, with that, Madam Chair, I yield back.

Ms. DEGETTE. Thank the gentleman.

The Chair now recognizes the gentleman from West Virginia, Mr. McKinley, for 5 minutes.

Mr. MCKINLEY. Thank you, Ms. Chairman.

To make sure that we understand, I don't think there's a person on this panel that I hear or in Congress that wants to see the mercury levels increase or cause problems. I think what we're trying to do is, what's the best way to reduce our exposure? And from what I can understand, using some of the information from the EPA, primarily we're getting our exposure to mercury by eating fish and shellfish.

Water is not necessarily a source of that, because we can capture that through the testing, and our municipal water systems will test for that. So I'm interested if it's the fish, if it's the ingestion of fish that we're getting. I did some study on this.

We saw on the Atlantic Coast, the Atlantic tuna, actually, the content or the exposure there to mercury has dropped precipitously, but yet on the West Coast, the mercury levels in the Pacific fish are increasing dramatically.

So we see something that's kind of—maybe it's relative to the fact that we've reduced by 86 percent the amount of mercury that

we're admitting from our coal-fired power plants because we understand the wind patterns, how that works, and I think from your—Dr. Selin, some of your testimony talked about it. Once it gets in the atmosphere, it can stay for thousands of miles, and it may be coming—we have coming from the Pacific rim, we have a chart that, unfortunately, I can't—it's not—I can't blow it up any more, but it simply shows that the big culprits in providing the mercury emissions into the atmosphere and primarily emitting into the water are coming from China and India, and we have a marked decrease. As a matter of fact, in one of the other reports we have here that was in 2016 says, from the EPA, that 83 percent—83 percent—of the mercury that's contaminating in the United States is coming from foreign sources. Eighty-three percent.

So, if we're really focusing here, not politics as we see some people chatting here, if we're really talking about how we're going to reduce our mercury levels in this country, I think we need to take into a global perspective of what we're going to do about this, because these other nations are continuing to emit mercury levels at very high levels.

So I want to go back to this cost-benefit ratio. If that premise is correct—and I'm not going to get caught up in whether or not the—whether it's "appropriate and necessary" and whether cobenefits—I think one of the things we should do, and maybe Gustafson, for you to respond would be, in cost-benefits, assuming even with the cobenefits, should we be considering the costs that would be incurred in foreign nations to reduce their mercury emissions?

And, right now, it's my understanding the costs are only to the American power plants that would be imposed, but the benefits would be derived by all. Since 83 percent is coming from someplace else, are we taking into consideration the costs that would be incurred in foreign nations to reduce so that we have a true cost-benefit ratio? Mr. Gustafson?

Mr. GUSTAFSON. You're exactly right that much of the mercury deposited in the United States comes from other countries, including China, and there's nothing that the Environmental Protection Agency can do to control pollution from China. That limits the effectiveness of any mercury control within the United States.

I would point out, though, that the premise of much of my fellow panelists' comments is that this mercury standard would go away if EPA were to finalize this proposed reconsideration of the fact finding. That's not true.

Under binding precedent in the DC circuit, a case called *New Jersey v. EPA*, the EPA would have to go through a delisting process in order to withdraw these sources from the mercury control. That's not likely to happen. So I don't think the risks that have been talked about here today are really relevant.

Mr. MCKINLEY. OK. Just in closing, just a second, do you think that we should include the costs incurred by other nations? It would be fair to include in the cost-benefit ratio, or should it just be the cost here in America but the benefits from all sources including PMs?

Mr. GUSTAFSON. That's a complicated question, and I'm not sure I'm prepared to give you an adequate response to it right now. I could follow up in written comments, but I think the EPA's pri-

mary responsibility is to address the Nation's air quality. That's what the Clean Air Act gives us jurisdiction for, and it's limited in its ability to do that by pollution from——

Ms. DEGETTE. The gentleman's time has expired.

The Chair now recognizes the gentlelady from New Hampshire, Ms. Kuster.

Ms. KUSTER. Thank you very much, Madam Chair.

And thank you to all of you for being with us. I apologize that many of us have a hearing going on at the exact same time on prescription drug pricing.

So I just want to focus in with Ms. McCabe about the current rule's cost-benefit assessment. Does it account for all of the known human health effects of mercury? And, in particular, it's my understanding that, since the rule was signed, there had been a whole series of papers published about health effects, since the risk assessment upon which the rule was based was done back in 2010 and much of these health effects were not known at that time. So could you bring us up to date on that?

Ms. MCCABE. Sure, yes. When EPA does a cost-benefit analysis, as it does for any major rule, it uses the best information that it has available, and we have a notice and comment process that allows everybody to bring to the Agency all the information that they have. And then the Agency makes the best decision looking at the full range of health benefits and recognizing that some of them we can monetize. We have studies that have helped us put a dollar figure on different health effects, but we also know there are many health effects that we cannot monetize. The work has not been done, or it's just extremely difficult to do that.

Ms. KUSTER. Are you aware of any new papers in the last decade that might shed light on this?

Ms. MCCABE. For sure, and we've heard about some of them today. So every minute people are doing work on this and there is more information coming forward. So, right now, today we have better information about the costs of reducing mercury, the cost, say, to human health, than we did in 2010, absolutely.

Ms. KUSTER. And is some of that information included? My understanding is that there are close to 500,000 comments recently. Is some of that included in that that we could review?

Ms. MCCABE. I believe so, that people who have been commenting on this proposal have brought forward all of this information.

Ms. KUSTER. This new data? And did the current rules' cost-benefit assessment account for the full extent of the U.S. population exposed to mercury through fish consumption? Specifically, it's my understanding it was a relatively narrow assessment of freshwater fish, but not any assessment of saltwater fish consumption?

Ms. MCCABE. Yes. That's a good question. We felt at the time that the information we had where we could attach a dollar figure was limited to certain kinds of people who consume fish caught nearby in their communities, and that's what we monetized.

And since then, there has been research to assign, you know, explain the benefits on a much wider prospective, in fact, the population across the country.

Ms. KUSTER. Madam Chair, I'd like to ask the committee staff if we could follow up and get that into the record on additional information.

In continuing this line of questioning, I'll go to—Mr. Livermore? Yes, thank you very much.

It's my understanding that OMB has instructed agencies to consider cobenefits in rulemaking and that cobenefits have been used in the development of regulations for decades.

Do you believe it was appropriate and legally justified for the Obama EPA to consider cobenefits in deciding to regulate mercury and other air toxics emissions? And if you could comment, did the EPA engage in double counting by counting reductions in particulate matter, which is regulated under a different provision of the Clean Air Act?

Mr. LIVERMORE. So it was absolutely appropriate for the Agency to consider cobenefits. It was consistent with the relevant guidance, with EPA's own peer-reviewed guidance, with OMB guidance which was published during the George W. Bush administration, and decades of practice of administrations of both political parties. So it was very consistent with all of that and normal practice to consider cobenefits.

Just to note, it's not like the Agency—cobenefits just mean that when the Agency regulates something that is targeted at, there's a kind of necessary and automatic other benefit that occurs. It's not the Agency's, you know—it has no choice, essentially, but to generate these benefits.

And then your second question was whether the Agency engaged in double counting, and the answer is just no. What double counting means is like when you get a benefit out of some rulemaking and then you also count it for some other rulemaking, something like that. There's actually lots of different ways that double counting could emerge. The Agency has guidance documents about how to avoid double counting, actually.

And in the mass rulemaking, every decision the Agency made was entirely consistent with its guidance to avoid double counting.

Ms. KUSTER. Thank you very much.

I yield back.

Ms. DEGETTE. Thank you.

The Chair now recognizes the gentlelady from New York, Ms. Clarke, for 5 minutes.

Ms. CLARKE. I thank you very much, Madam Chair.

And I thank our panel of experts for appearing before us today.

I wanted to clear something up in response to Mr. McKinley's line of questioning.

Dr. Selin, can you please explain the distribution of mercury for us? Isn't it true that mercury emissions are distributed both regionally and globally?

Dr. SELIN. Yes, that's absolutely correct. Mercury in the United States comes from both domestic and international sources, and the deposition of mercury to the United States is impacted by both of those sources. We've actually done some research that is directly relevant to the previous question looking at the benefits of domestic versus international controls on mercury, and we found that, per every ton of mercury emissions, the benefits to the U.S. are in

order of magnitude higher from the MAT standard than from international emissions. That really underlines the importance of mercury reductions, not only for domestic benefits in the U.S. but also for regions in the U.S. that are particularly affected.

Ms. CLARKE. Very well. I thank you for that clarification. EPA is claiming that its proposal responds to a 2015 Supreme Court decision, *Michigan v. EPA*, that requires the Agency to consider costs before deciding whether to regulate mercury and air toxins from power plants, but EPA already responded to the Supreme Court ruling in 2016 when it issued its supplemental finding, and now the mercury standards that took so long to put in place have been fully implemented. Mercury and toxic air emissions are down substantially, and the American people are reaping the benefits.

So I want to put all of this in perspective and ask, Ms. McCabe, is there any court ruling that requires EPA to reopen the “appropriate and necessary” finding at this time?

Ms. MCCABE. There is not. They’re doing this totally on their own.

Ms. CLARKE. EPA asserts that its action to reopen the finding and compare only the so-called direct benefits of the rule to cost is, quote, “reasonable and may be the only permissible approach,” end quote, here.

Mr. Livermore, as someone who understands cost-benefit analysis and its interaction with the Clean Air Act, do you agree that the EPA’s hands are tied here, as it claims?

Mr. LIVERMORE. Absolutely not. In fact, in *Michigan v. EPA*, the Court explicitly said that it was not ruling on the question of cobenefits. If you’ve noted, a couple of folks have mentioned Justice Roberts’ discussion at oral argument. If you’re grasping for comments during oral argument, that’s not the law; the law’s what’s in the case. The case explicitly does not address this question.

Ms. CLARKE. And in your testimony, you state that the EPA’s proposal provides no adequate explanation for its extraordinary and abnormal treatment of cobenefits. Can you explain why you believe EPA’s new approach is such a departure from the norm?

Mr. LIVERMORE. Absolutely. So, again, in OBM guidance that had been around for decades that were adopted by the George W. Bush administration, the—not just EPA but every agency is instructed to account for both direct and indirect costs and benefits.

The Agency has its own peer-reviewed guidance on this question where it states that indirect benefits should be counted and direct costs and benefits, and decades of practice from administrations of both political parties.

Ms. CLARKE. Very well.

And, Ms. McCabe, I’m worried that it is the administration that is making standards legally vulnerable. EPA seems to acknowledge this by taking comments on whether to move the MAT standards altogether.

Ms. McCabe, does this suggest to you that the EPA understands that it is leaving the standard legally vulnerable if it goes forward with this proposal?

Ms. MCCABE. I think they do understand that, and there’s been a lot of discussion today about why on Earth are they doing this if they really mean it that they don’t mean to undo the standards.

If they want to change a policy about cost-benefit analysis, they could do it in any rule or a separate policy, but they're specifically doing it in the MATS rule. And so I think if people think that EPA is not going to be asked now to move forward to vacate the rule if they rescind the "appropriate and necessary" finding, they are mistaken. The request will come immediately.

Ms. CLARKE. Ms. McTeer Toney, turning to you, what message does it send that EPA is voluntarily taking action to undermine these critically important public health protections?

Ms. MCTEER TONEY. It makes the statement that the health of our children is not as important to them as the cost to industry.

Ms. CLARKE. Yes, the EPA is voluntarily reopening this finding, and its action could risk all the progress that's been made in getting dangerous toxins from power plants out of the air.

Why the EPA is spending time to fix something that doesn't need to be fixed is beyond comprehension.

I yield back, Madam Chair.

Ms. DEGETTE. Thank you, gentlelady.

The Chair now recognizes the gentleman from Virginia, Mr. Griffith, for 5 minutes.

Mr. GRIFFITH. Thank you very much, Madam Chair. I appreciate it.

Mr. Gustafson, my understanding is that the rules that are being looked at by the EPA currently were actually in the DC circuit being reviewed when the administrations changed. Is that accurate?

Mr. GUSTAFSON. That's correct. The case is still pending right now, *Murray Coal v. EPA*.

Mr. GRIFFITH. So am I correct that the EPA would either have to defend the Obama administration position on the costs or take a look at it? Is that correct?

Mr. GUSTAFSON. That's exactly right.

Mr. GRIFFITH. So is it some shock that the Trump administration might want to look at some regulations or the impacts of regulations brought about in a prior administration?

Mr. GUSTAFSON. I don't think it's a shock at all. It's perfectly normal for an incoming administration to request that challenges to pending rules be held in abeyance while the Agency can reexamine those rules. That's exactly what happened here, and when an agency determines that its prior action is not defensible, it is perfectly within the rights of the agency, and it's only responsible for the agency to stop defending it and instead to improve what they see as unjustifiable action. That's what happened here.

Mr. GRIFFITH. It's interesting because the Court did say that the costs had not been reviewed. It's interesting when you take a look at costs, it would appear to me, at least, that the costs and the benefits that are looked at—we're looking at the cobenefits and the particulate matter and all of that, but many areas, including my district, we had four facilities shut down; two were reopened as natural gas. But four coal facilities were shut down, two of those never to be reopened.

The cost to the community was huge as well. Loss of jobs, loss of big incomes, loss of taxes, et cetera, et cetera. Wouldn't it only be reasonable if you're going to consider cobenefits when you're

doing the benefit analysis to consider the cocosts or the colosses in a community as well?

Mr. GUSTAFSON. That's exactly right, and I think regulatory economists would agree that it's only a good practice when you're considering cobenefits to also consider corresponding cocosts. That was not done in this case. The past administration looked at cobenefits, but it only looked at direct costs. It didn't consider what higher electricity prices and plant closures could do economywide, and I think there are a lot of important costs that were neglected there. I would point out, though, that the cost-benefit methodologies that have been discussed today pertain to what agencies do in the regulatory impact analysis. That's not changing here.

EPA has said it's not proposing to alter the way it reports benefits to OIRA. It's only changing—deciding what it will do for the “appropriate and necessary” determination in the context of this statute.

Mr. GRIFFITH. OK. And so it's not like the whole rule is going away. It's just an interpretation on how you do the analysis. Is that correct?

Mr. GUSTAFSON. That's right. This rule is not going away. The Agency isn't able to take it away under binding circuit case law, *New Jersey v. EPA*, and I'm not aware of anyone who intends to petition EPA for delisting. That's what would be required.

Mr. GRIFFITH. Now, my team over here has got a map, and it's a little dated, I will admit. It's from 2006, but I've always thought it was interesting when we talk about mercury—we care about families, and we care about families across all matters. Does anybody know if this number—if this has changed? So what you're seeing is all the red area is where foreign mercury is predominantly the cause of mercury in the United States. You do see issues in the east, particularly in my region of central Appalachia and some of the other areas, where that shifts, but does anybody know if that has changed, or are we still getting a tremendous amount of our mercury from overseas sources? Yes, ma'am?

Dr. SELIN. I can answer that. We definitely do see these two patterns of domestic mercury deposition and international mercury deposition happening in the U.S., and you're quite correct that a lot of the deposition that we see to the United States from U.S. sources happens in the east. That's where many of the major sources are, and that's where many of the populations are impacted from those sources.

We have seen mercury emissions go down quite a bit as a result of this rule, so we have seen declines in depositions.

Mr. GRIFFITH. I think we're all glad about that, but we want to make sure that the cost measures are accurate. One last thing: Where should I be looking to get my fish from? Because I eat a lot of fish, and I understand there's a lot of mercury in it. Are you there—who can answer the fish question?

Ms. McTEER TONEY. Well, I can help you out with part of that, because that's one of the things that we do at Moms Clean Air Force, is we make sure that we provide our mothers with this information, and so I think you ask a very interesting question, because certainly mothers that are in the United States of America, we rely on the U.S. Environmental Protection Agency to ensure the

regulation here in the U.S. is correct, and we've been doing so. And we try to make it really clear so that our moms know, when you get pregnant and you go to the doctor and they tell you, "Don't eat the tuna" or "You're not supposed to eat as much fish," why that happens.

And so for our Native American moms and moms of color and people who live close to these water bodies, they need to understand that, when they're living right next to that facility, where the fish comes from and how it impacts the child's brain. So that was a really good depiction of what's happening in the east, where it's very localized to people, and I really hope that that type of information can be shared so that our Nation can understand why it's so important for us to be a part of global conversations. Unfortunately, we've pulled out of those at this time, but I hope—

Ms. DEGETTE. The gentleman's time has expired.

Mr. GRIFFITH. I yield back.

Ms. DEGETTE. Ms. Toney, we'd love to have a copy of that for our committee so we can look at it. Thank you.

The Chair now recognizes the gentleman from California, Mr. Peters, for 5 minutes.

Mr. PETERS. Thank you, Madam Chair.

Thank you to the witnesses. I'd like to spend a few minutes talking about the effectiveness of the mercury and air toxic standards. It just seems to me from what we've heard that, by any measure, that the Obama era rule has worked. The Trump era's—the Trump's EPA 2018 proposal shows that—the proposal itself shows that mercury emissions from power plants has decreased by 86 percent from 2010 to 2017 and that total air toxics emissions have been cut by 96 percent during that same period.

Dr. Selin, how has this decline in mercury emissions affected human health and the environment, and what would you think about putting these standards at risk?

Dr. SELIN. Well, yes, as you say, there have been a lot of declines in mercury—mercury emissions—as a result of this rule. We've also seen declines, for example, in fish in the Atlantic that are occurring at the same time, and we would expect that this has substantial benefits to human health and the environment in the United States, and any effort to roll back this rule would then increase mercury emissions which would threaten those declines.

Mr. PETERS. With respect to my colleague's chart, Mr. Griffith's chart, it showed the percent of mercury that came from other places but didn't show the amount of mercury that was being deposited. Would you acknowledge that that's the case?

Dr. SELIN. That's true.

Mr. PETERS. OK, and so the fact that a large percentage of mercury in the west may come from foreign sources doesn't reflect the fact that a large—that maybe a lot less is being deposited. In fact, that we can do a lot for our country, particularly in the east, by reining in the sources, as the Obama rule did.

Dr. Landrigan, you say in your testimony that the mercury and air toxic standards, quote, "prevent brain injuries, protect children's lungs, and save lives." If we're to lose the protections we have in place now, can you give us—I mean, you've touched on this

a little bit before, but can you give us a general sense of what would happen to children in that instance?

Dr. LANDRIGAN. Well, yes, sir, thank you for that question. Mercury damages the human brain, and the human brain is most vulnerable to mercury in the earlier stages of development, during the 9 months of pregnancy, in infancy, and childhood. So, if mercury emissions were to increase because of the cascade of actions that's being initiated through the removal of—the proposed removal of this provision, the result would be more brain damage in children, lowered IQ, behavioral problems, problems that last a lifetime that cannot be treated medically.

Mr. PETERS. Thank you. I want to just observe that in the testimony of Ms. McTeer Toney, a former EPA official, now national field director for the Moms Clean Air Force, who are represented here in the audience, she cites, quote, "broad opposition to this proposal not only from parents, children, and grandparents but also from doctors, nurses, faith leaders, anglers, conservationists, and more. Even the regulated industry itself opposes this proposal."

I wanted to ask, Ms. McCabe, if public health officials don't want this rule to go away, environmental groups don't want this rule to go away, many States say they don't want the rule to go away, even the regulatory industry does not want the rule to go, who is EPA trying to help with this proposal?

Ms. MCCABE. Yes, it's a good question, and I don't—I can't speak for EPA. I don't know, but I can think of two reasons why they would do this. One is that this administration has made very clear that they will do anything they can to help the coal industry, and this rule is sort of top of the list, even though, as you acknowledge, it's been implemented and the utilities are ready to move on.

The other reason for doing this is to use it as sort of a flagship to inaugurate this new way of looking at benefits, at devaluing the full range of benefits. And I would offer the analogy of quitting smoking. If you quit smoking to reduce your chances of getting lung cancer, you are also having all kinds of other health benefits to you and the people around you—

Mr. PETERS. And it doesn't affect your jurisdictional power to quit smoking—

Ms. MCCABE. They come along for the ride, but they're real.

Mr. PETERS. Can I just say to conclude that we talk a lot about a number of pollutants in here, but we talk about heavy metals like lead and mercury. Those are the absolute worst things for children. They cause lasting, permanent damage, and we ought not to mess around with those here, and I oppose this awful action by the EPA.

And I yield back.

Ms. DEGETTE. The gentleman yields back.

The Chair now recognizes the gentleman from Maryland, Mr. Sarbanes, for 5 minutes.

Mr. SARBANES. Thank you, Madam Chair.

Thank you all for being here.

Mr. Livermore, a moment ago something was said that I wanted to follow up on regarding the cost considerations. Did the EPA consider cocosts when it was finalizing these standards in 2012? Because the suggestion was made that it did not.

Mr. LIVERMORE. It did.

Mr. SARBANES. It did, and is it considering them now?

Mr. LIVERMORE. It's not revisiting it, so it's a cost estimate, so, essentially, yes.

Mr. SARBANES. OK. Let me get more into the benefits and cost discussion because that's obviously central here to the differing views we have on this matter, and we got to get those numbers right.

Dr. Selin, in your testimony, you state that "the assertion by EPA that the MAT standards result in \$4-6 million in mercury-related benefits to the U.S. is out of date and incorrect" and "the best available scientific information suggests that the mercury-related benefits that can be quantified are orders of magnitude more than that"—in fact, "in the billions of dollars." Your study estimates \$3.7 billion in annual benefits just from the mercury reductions alone.

Why is that number so different from the \$4 million to \$6 million that's relied on by the EPA?

Dr. SELIN. Yes, the EPA's estimate is really only a partial analysis of the benefits of the MAT standard, and our estimates are larger for two basic reasons, one of which is the EPA's estimate only looked at people who consume fish they catch for themselves in freshwater, and we looked at the whole U.S. population. And the second is we included both impacts on reduced IQ as well as cardiovascular impacts of reduced heart attacks. EPA only looked at the reduction of IQ in newborns.

Mr. SARBANES. So you're taking a very broad perspective, which I think is the prudent one to do. I also know that now that the MATS has been implemented for several years, we have some sense of how much it costs industry to comply. And so, Mr. Livermore, I'm going to come to you on this. According to 2015 analysis, costs of compliance with the mercury standards were about \$7 billion less than the EPA estimate in 2011 because we've had a lot of technological improvements. We see this across many industries, and actually, in many regulatory environments where initially people resist it, they anticipate the costs will be overwhelming and too burdensome, and then technology kind of keeps the model changing over time.

So that's the technologies kicking in, reduced prices of natural gas and so forth, and in your testimony, you say that the EPA's treatment of cost is "irrational" because "it fails to acknowledge the overestimation of regulatory costs associated with the 2012 MATS Rule." So, in your view, how should the Agency consider costs now that the rule has been complied with?

Mr. LIVERMORE. If the Agency actually wanted to look at what the costs and benefits of the rule going forward were, then—exactly—it would take into account both the fact that costs were lower than they were anticipated and the reality that most of the costs have already been incurred, and it does neither of those.

Mr. SARBANES. I mean, I think what we see going on here by the administration is they're really just kind of picking and choosing. They're not concerned about apples to apples or oranges to oranges either by category or temporally or anything else. They find the number that works for the argument that they're making or the policy change over here. Then they'll grab that, and then they'll

grab something else to advance their position, even if those things don't rationally—are not rationally compatible.

So they're clinging to these numbers that are hand-picked out of 2011 analysis. Without too much elaboration, their proposal states that, even if it considered new information, quote, "the outcome of the Agency's proposed finding here would likely stay the same."

Ms. McCabe, it seems implausible that the Agency can reach this conclusion without even considering this new information. Can the Agency in your view put at risk up to 11,000 lives a year based only on its guess here that the new information, quote, likely wouldn't make a difference?

Ms. MCCABE. Well, that caught my eye too when I read the proposal. It doesn't seem like the way you should do rulemaking, to anticipate what people will tell you and then decide. So better would be to see what people bring forward and thoughtfully consider that. And as we've seen, there is significant new information that should factor into that decision and seems like it would lead to a different outcome than what they presumed in the proposal.

Mr. SARBANES. Thank you for that.

And when the health of the American people is at stake, we ought to pay attention to science. We ought to come up with standards that make sense. We ought to rationally align those. I don't see that happening here with the Trump administration's proposal.

With that, I yield back. Thank you.

Ms. DEGETTE. The Chair now recognizes the gentlelady from Indiana, Mrs. Brooks, for 5 minutes.

Mrs. BROOKS. Thank you, Madam Chairwoman, and I apologize because I've been going—coming back and forth from the Health hearing.

And so I want to welcome you, Ms. McCabe. Glad to have a Hoosier on the panel.

And, with that, I'm going to yield my time to our ranking member, Mr. Guthrie.

Mr. GUTHRIE. Thank you. I thank my friend for yielding.

I know that there is a drug pricing hearing going on just downstairs from us, a couple of levels down. So I want to finish with some testimony from Mr. Gustafson. In your testimony, you note that EPA's 2016 supplemental finding adopted a cost reasonableness methodology as its preferred approach to making an "appropriate and necessary" finding.

Under this approach, the EPA concluded that the cost of MATS is reasonable because compliance costs are well within the range of historical variability and that the power sector is able to comply with the rules requirements while maintaining its ability to perform its primary and unique function, which is the generation, transmission, and distribution of reliable electricity at reasonable costs to consumers.

So my question is, having said that, do you believe that the cost reasonableness test was an appropriate response at the Supreme Court's decision in *Michigan v. EPA*? Why or why not?

Mr. GUSTAFSON. Absolutely not. The Court in *Michigan v. EPA* made very clear that a rule is not reasonable, much less appropriate, if its costs outweigh the benefits by a substantial degree,

and so, in order to do that analysis, you would need to know what are the costs and the benefits.

The cost reasonableness approach does not look at whether the costs are justified by the benefits. It only asks whether this will be destructive to the industry.

Mr. GUTHRIE. OK. Why do you think the former administration chose this as their preferred approach?

Mr. GUSTAFSON. I think they chose it because they realized the vulnerability of their cost-benefit estimate, and they wanted to buttress their finding with an argument that doesn't require a court to look behind and see what are the relative costs and benefits.

Mr. GUTHRIE. OK, and so why, in your opinion, did the former administration include both a preferred approach and an alternative approach in their 2016 supplemental finding?

Mr. GUSTAFSON. Well, I think it was a belt-and-suspenders approach to the litigation. I think they realized that, if the Court were only looking at their cost-benefit analysis under the secondary approach, that cost-benefit analysis was vulnerable to the judicial determination that it's unreasonable to look at particulate matter cobenefits as equal to the direct benefits of mercury reduction. And so I think they needed both to try to make it as strong as they could. I think neither of them is an adequate approach.

Mr. GUTHRIE. So this next question kind of gets into where you—in what you said for some of your answers this morning, but in your written testimony, you note that “by ceasing to rely on particulate matter cobenefits to justify hazardous air pollution regulation, EPA’s new proposal takes an important step toward rationalizing future air quality regulation without actually altering the mercury standard itself.”

So can you explain what you mean that this “proposal takes an important step toward rationalizing future air quality regulation”? And, likewise, do you think the changes to the “appropriate and necessary” finding will have an impact on future regulation?

Mr. GUSTAFSON. I hope so, in answer to the last question. I think that if EPA—first of all, I would agree with the panelists who have pointed out that the Agency should be consistent in its cost-benefit approach. I think if the Agency is consistent about what it's proposing here, that it would not include criteria pollutants, like particulate matter and ozone, in cost-benefit analyses, at least, under the “appropriate and necessary” determination of section 112 in the future. That would be an improvement on the status quo.

I think, more broadly, it would be appropriate for the Agency to consider how it does cost-benefit analysis even for regulatory impact analyses. Although, I would point out that that is different from what the Agency is proposing here. So circular A4 applies to that. It does not apply to what the Agency is doing here.

Mr. GUTHRIE. So you made the point several times this morning that dropping the “appropriate and necessary” standard, making changes to the “appropriate and necessary” standing, won't have impact on the standard; the standard will still stand and have to go through a delisting process. And so, in your opinion, that dropping the “appropriate and necessary”—obviously, the standard could be challenged in court as well. So you're saying it has—it

could be delisted or could be challenged in court. So you're saying that it won't have any impact on the standard, in your opinion?

Mr. GUSTAFSON. I don't think it'll have any impact on the mercury standard to the court—the DC circuit, which is the court that hears all the Clean Air Act rules of nationwide application and which would be the court reviewing this decision, has made clear that, in order to get rid of the standard, you would have to delist the source.

It's not sufficient just to say that it's no longer "necessary and appropriate." That delisting process is set out in statute, and it's a very high bar that I would be surprised if it could be met.

Mr. GUTHRIE. Not being an attorney, if it's necessary to be "appropriate and necessary" for the standard and that goes away, it seems like that would still be a requirement it needed to be, but I understand your—

Mr. GUSTAFSON. I share your instincts on that point, but the DC circuit in this *New Jersey v. EPA* case basically said that, because the statute includes a delisting provision, it sets out clear standards by which a source can be delisted, therefore the Agency does not have jurisdiction to withdraw the rule for other reasons.

Ms. DEGETTE. The gentlelady's time is expired.

The Chair now recognizes the gentleman from California, Mr. Ruiz, for 5 minutes.

Mr. RUIZ. Thank you, Chairwoman.

Mercury is clearly a dangerous toxin, and exposure to it can have permanent neurological effects for, particularly, small children. In EPA's own regulatory impact on analysis for MATS, EPA noted that exposure to mercury can cause a host of public health harms.

Dr. Landrigan, your work has highlighted the importance of controlling toxic pollutants like lead and mercury in our environment and the impacts that these pollutants can have, especially on children.

So what should the public know about the harmful effects of mercury, particularly on children? And then why this rule is so important in protecting them.

Dr. LANDRIGAN. Thank you, Mr. Ruiz.

So what the public should understand about mercury is that different segments of the population have different sensitivity, and the two groups in the population who are most sensitive are, first, the pregnant women, not for the health of the woman herself but for the health of her unborn child and, secondly, small children, toddlers, and kids in general. And the reason that those segments of the population are so vulnerable is that it is during those periods of life, the 9 months of pregnancy and first years after birth, that the human brain is going through this extraordinarily complex development that is necessary to produce—

Mr. RUIZ. And so what can happen to their development if they are exposed?

Dr. LANDRIGAN. So, yes, if a toxin like mercury gets into the developing brain through the mother or into the child, it can damage the brain. The consequences are reduced IQ, shortened attention span, behavioral problems. These problems last lifelong, and there is no medical treatment for them.

Mr. RUIZ. Thank you.

Dr. LANDRIGAN. The international approach is prevention.

Mr. RUIZ. Thank you.

EPA's 2018 proposal claims that benefits of mercury reduction would be between 4 and 6 million dollars per year based on results of 2011 analysis. However, Dr. Selin, your 2016 paper in the Proceedings of the National Academies of Scientists show that the projected lifetime benefits of mercury reductions would be \$147 billion through 2050, or an annualized benefit of \$3.7 billion per year. That is a much larger number than what EPA has said. Can you briefly describe how you were able to determine these impacts?

Dr. SELIN. Sure.

What we were able to do was actually take into account a larger population of people affected. So we had an analysis that took into account not only people who were eating freshwater fish but also marine fish, which is the majority of exposure to the U.S. population.

Mr. RUIZ. So you had more subjects to have more accurate statistical analysis, and you also compared a group exposed and a group not exposed?

Dr. SELIN. So what we did was we projected the impacts of the standards, and we can compare that to what would happen without the standards. So in addition to just looking at a broader population, we also considered all adults and cardiovascular impacts, so heart attacks, which is also an impact of mercury.

Mr. RUIZ. Well, \$3.7 billion per year, that is much larger than the 4 and 6 million per year.

Dr. Selin's study does not appear to be an outlier. In fact, for example, a study from 2017 in the Journal of Environmental Health calculated the economic cost of methyl mercury exposure in the U.S. to be \$4.8 billion per year. And yet EPA continues to rely on the outdated 2011 estimates to justify their proposal.

Dr. Landrigan, while the MATS standards control for mercury and air toxic emissions, they also have important additional benefits of controlling particulate matter emissions. EPA estimates that the MATS rule would prevent up to 11,000 premature deaths, 4,700 heart attacks, and 130,000 asthma attacks annually beginning in 2016, and yet EPA seems to be ignoring these benefits in their new proposal.

Dr. Landrigan, do you agree that the reductions in particular matter, pollution, that directly result from compliance with MATS is important for a public health perspective?

Dr. LANDRIGAN. Yes, I do. Air pollution causes disease across the lifespan. Air pollution exposure in a pregnant mother results in increased risk of small prenatates babies. In children, it produces asthma or pneumonia. In adults, heart disease, stroke, lung cancer, chronic obstructive lung disease.

Mr. RUIZ. Thank you.

Ms. McCabe, was it appropriate for the Obama EPA to consider these benefits in its cost analysis even though particulate matter is regulated under a different provision of the Clean Air Act than the one that addresses mercury and other air toxins?

Ms. MCCABE. It was absolutely correct. It followed decades of standard peer-reviewed agency practice to consider cobenefits.

And I will just note that, in the MATS rule, EPA was not regulating particulate matter. It was regulating toxics. And the technologies that utilities were expected to use to control mercury necessarily also control other air pollutants.

Mr. RUIZ. Thank you.

Given what we have heard here today about the harm mercury can cause, it still boggles my mind why anyone would go out of their way to undermine these standards.

I yield back my time.

Ms. DEGETTE. I thank the gentleman.

The Chair now recognizes the ever-patient Mr. Soto for 5 minutes. And welcome to the subcommittee, as always.

Mr. SOTO. Thank you, Madam Chair.

I want to take a few minutes to talk about industry compliance with the mercury and air toxic standards. And just as a first listing to everybody here in the committee meeting, it is dumbfounding why we would be rolling back standards to protect children and the general public from mercury and air toxic poisoning when industry isn't even asking for it. I mean, it is absolutely an absurd kowtowing to an industry that isn't even requesting to be kowtowed to. I don't even know where to begin.

But I will begin by talking about—Administrator Wheeler testified before this committee and acknowledged last month that the industry is largely in compliance with these standards because the power industry has made significant investments in the rule and has urged EPA not to undermine it. So at least we have reasonable actors in the private sector.

On March 26 of this year, a collection of associations that represent the power industry wrote in an EPA letter, quote, "Given this investment and industry's full implementation of MATS, regulatory and business certainty regarding regulations under the Clean Air Act section 112 is critical. We urge the EPA leaving the underlying MATS rule in place and effective." This was by both our rural electric co-ops, by LIUNA, IBEW, and other unions.

Ms. McCabe, are you familiar with this letter? And what is your reaction?

Ms. MCCABE. Yes, I am. And I totally get it. I have spent my whole life in State and Federal environmental agencies. And the thing that industry wants most is certainty. They want to know what the rules are and that they will stay in place.

And what this is doing is injecting uncertainty, potentially years. Because if they finalize this proposal, it will be litigated. People will come forward and try to start the process to roll the rule back, which will create more uncertainty. And they have made these investments. They are either already getting ready rate recovery on it or they're seeking rate recovery on it. And this just complicates everything for them.

Mr. SOTO. So the administration's proposal, is in fact, injecting more uncertainty at a time when we had standards working that were better protection for the public. Thank you.

Mr. Livermore, do you agree?

Mr. LIVERMORE. Yes. Absolutely. All this rule does is create uncertainty. It is possible that the rule will be upheld. That is—if the Agency moves forward with the "appropriate and necessary" deter-

mination, that is the opinion of some folks. Frankly, I hope that that's correct. But we don't know that in advance, and we are putting the lives of thousands of Americans and neurological development of our children on the line on that supposition.

Mr. SOTO. And this includes the proposal by EPA to revoke the precursor findings from MATS?

Mr. LIVERMORE. Yes. That is a direct consequence of that.

Mr. SOTO. And, Mr. Livermore, how can we be certain that EPA's proposal will not undermine the existing mercury rule?

Mr. LIVERMORE. We can't be certain.

Mr. SOTO. Is EPA voluntarily exposing itself to some legal risk here?

Mr. LIVERMORE. Absolutely.

Mr. SOTO. Is the Federal Government at risk of rolling these back?

Mr. LIVERMORE. No question that there is going to be risk involved. It is very likely to get litigated. Anyone who thinks they have a crystal ball and can make perfect predictions about what the DC circuit is going to do is diluting themselves.

Mr. SOTO. And in your testimony, you bring up the Peabody Coal issue. And what does that mean for industry and public health?

Mr. LIVERMORE. I am sorry?

Mr. SOTO. Ms. McCabe.

Ms. MCCABE. Yes, I think that is me.

So that is just an example of how industry is presuming that the rule is going to go away. This was in a proceeding at the Indiana Utility Regulatory Commission. And a Peabody entity commented that the industry was overestimating its future costs of MATS compliance because it said this proposal is likely to lead to the withdrawal or the rolling back of MATS. So that is how they are thinking about this.

Mr. SOTO. Well, I can tell you these standards and the overall lax of enforcement of coal ash, one of the biggest producers, is affecting my district and my family's native island of Puerto Rico. We recently sent letters over the last term about the Penuelas Valley landfill in Puerto Rico. And while we are trying to transition away from coal, more and more of that toxic coal ash is remaining in Puerto Rico. And just recently, my district—unfortunately, we had an attempt to import some of that coal ash into Osceola County, Florida.

And so I would like to hear—first, I would like to introduce letters to the EPA that I sent regarding these two issues and would also want to hear from you, Ms. McCabe. Does this put my community and the communities in Puerto Rico at risk if we continue to burn coal and have these ashes accumulate?

Ms. MCCABE. Well, we know, certainly, from years of experience and study that coal-fired power plants pollute the environment in many ways through air pollution of many different kinds of pollutants, through water pollution, and through the creation of waste like coal ash. So the continuation of these facilities creates those risks in those communities.

Mr. SOTO. Ms. McTeer Toney, I represent a community that has a large community of color, and we also have, in Puerto Rico, an island of predominantly Hispanics.

Is this often the case, that communities of color bear the brunt of coal ash?

Ms. McTEER TONEY. Unfortunately, yes. Front-line and fence-line communities are oftentimes communities of color. These are communities that are located directly adjacent to, right next to, coal-fired power plants and are the communities that hit the impact the most and the earliest.

Mr. SOTO. I have the letters for potential submission.

Ms. DEGETTE. I thank the gentleman.

The Chair now recognizes the ranking member for a few final comments.

Mr. GUTHRIE. Just a closing statement.

When I did my opening statement, I said I hope we can have an intelligent discussion on what the issues are and how we regulate and how Congress designed the Clean Air Act, the 1990 amendments. And, you know, we have the cobenefits being 99 percent of the cost. So maybe we need to fix that. That is something Congress needs to look at. I think we have had that.

The one group missing today is EPA. And EPA—it is Congress—it's our responsibility, both sides of the aisle, to have investigation oversight. And it would have been helpful had the EPA been here today. And they have said they were going to make themselves available. And we hope that happens, because I think it is important for the Members to have the opportunity to talk to the EPA and the decisionmaking around this.

And so it is my commitment to work with—if we have another date that we can make this work, as the ranking member, to work to get the EPA here to testify before this committee, because that is our responsibility under the Constitution for oversight, and we need to exercise that.

So thank you.

Ms. DEGETTE. I thank the ranking member for those comments. And, unfortunately, today's hearing is not the first hearing in this subcommittee that we have had trouble getting the administration to appear. So anything that your side could do to help us, because it really does help complete the record of these hearings.

Having said that, I want to thank all of the witnesses for appearing today. This was an excellent panel, an excellent discussion.

I would like to insert the following documents with unanimous consent into the record. They have all been cleared by the minority. The slides that Ms. McTeer Toney gave us about how mercury poisoning works; a letter to Administrator Wheeler dated May 10, 2019, by a bunch of members of this subcommittee and the full committee; a letter dated April 17, 2019, from the Environmental Law and Policy Center to the EPA; a letter by a coalition of groups dated March 26, 2019, that Mr. Soto asked for submission to the record; and a letter dated September 5, 2017, from Mr. Soto to Administrator Pruitt.

I would asked unanimous consent those all be entered into the record. So ordered.

Mr. SOTO. Madam Chair, there's actually a third letter, which is the response.

Ms. DEGETTE. OK. I ask unanimous consent for the third letter, which is the response from the EPA. And that is inserted too.

[The information appears at the conclusion of the hearing.]

Ms. DEGETTE. I want to remind Members that, pursuant to committee rules, that everyone has 10 business days to submit additional questions for the record to be answered by witnesses that have appeared before the subcommittee. And I would like to ask all the witnesses, if you do get those questions, please respond promptly.

And with that, the subcommittee is adjourned.

[Whereupon, at 12:13 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]



U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON ENERGY AND COMMERCE

May 20, 2019

TO: Republican Members, Committee on Energy and Commerce

FROM: Committee Minority Staff

RE: Hearing entitled “Undermining Mercury Protections: EPA Endangers Human Health and the Environment.”

The Subcommittee on Oversight and Investigations will hold a hearing on Tuesday, May 21, 2019, at 10:00 a.m. in 2322 Rayburn House Office Building entitled “Undermining Mercury Protections: EPA Endangers Human Health and the Environment.”

I. WITNESSES

- Adam R.F. Gustafson, Partner, Boyden Gray & Associates PLLC;
- Philip J. Landrigan, M.D., M.Sc., Director, Global Health Program and Global Pollution Observatory, Schiller Institute for Integrated Science and Society, Boston College;
- Michael A. Livermore, Associate Professor of Law, University of Virginia;
- Janet McCabe, Former Acting Assistant Administrator, Office of Air and Radiation, U.S. Environmental Protection Agency;
- Noelle Eckley Selin, Ph.D., Associate Professor, Massachusetts Institute of Technology; Director, MIT Technology and Policy Program; and
- Heather McTeer Toney, National Field Director, Moms Clean Air Force.

II. BACKGROUND

A. Mercury

Mercury, a naturally occurring metal, is present in the earth’s crust and is naturally in coal and other fossil fuels.¹ Mercury is released into the environment through one of two ways. It can either enter the atmosphere naturally, such as through volcanic eruptions, forest fires, or the normal breakdown of minerals in rocks and soil, or it can be released by human activity such

¹ EPA, *How People are Exposed to Mercury, Exposures to Methylmercury, How Does Mercury Get into Fish and Shellfish* (last visited May 15, 2019), available at <https://www.epa.gov/mercury/basic-information-about-mercury>.

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as the burning of materials that contain mercury.² Mercury may descend to the ground relatively quickly, or, in the alternative, mercury may remain in the air for a prolonged period of time and may travel across continents; in such circumstances, it will be considered part of the “global cycle.”³ Mercury levels in certain areas will depend on how much mercury is released not only locally, but also how much is released regionally, nationally, and internationally.⁴

Once released into the atmosphere, mercury will eventually deposit into bodies of water, including lakes and streams, or onto land—where it also will ultimately be transported into water. In the water, microorganisms can change the mercury into methylmercury, and the methylmercury will accumulate in fish and shellfish.⁵ Not all fish, however, contain similar amounts of mercury; fish higher up the food chain tend to be more dense in mercury due to the fact they consume the smaller, mercury-containing fish.⁶

Exposure to methylmercury is common; most people demonstrate levels of mercury in their system.⁷ Additionally, exposure to mercury takes several forms. A person may be exposed through the consumption of fish, breathing air vapors from spills, incinerators or the burning of mercury containing fossil fuels, the release of mercury from certain dental work and other medical treatments, as well as from practicing rituals that involve mercury.⁸ Nearly all human exposure to methylmercury in the United States, however, occurs through fish and shellfish consumption.⁹

With respect to pregnant women, methylmercury absorbed by the mother will move through the placenta, into the bloodstream of the unborn infant, and then into the unborn infant’s tissue and brain.¹⁰ Because unborn infants are the most vulnerable population with respect to the effects of methylmercury, such transfer of methylmercury from the mother to the unborn infant can have detrimental effects on the unborn infant’s health.¹¹ Furthermore, methylmercury may adversely impact an infant in several ways—the impacts may be subtle or extreme depending on

² *Id.*; CDC, *Public Health Statement Mercury*, Agency for Toxic Substances and Disease Registry (1999), available at <https://www.atsdr.cdc.gov/ToxProfiles/tp46-c1-b.pdf>.

³ EPA, *How People are Exposed to Mercury* (last visited May 15, 2019), available at <https://www.epa.gov/mercury/how-people-are-exposed-mercury>.

⁴ *Id.*

⁵ *Id.*

⁶ *Id.*

⁷ United States Environmental Protection Agency, *Health Effects of Exposure to Mercury, Methylmercury Effects, Effects on People of All Ages*, (last visited May 15, 2019), available at <https://www.epa.gov/mercury/health-effects-exposures-mercury>.

⁸ CDC, *Mercury-ToxFAQs*, Agency for Toxic Substances and Disease Registry (1999), available at <https://www.atsdr.cdc.gov/toxfaqs/tfacts46.pdf>.

⁹ EPA, *How People are Exposed to Mercury, Exposures to Methylmercury, How Does Mercury Get into Fish and Shellfish* (last visited May 15, 2019), available at <https://www.epa.gov/mercury/basic-information-about-mercury>.

¹⁰ *Id.*; See also *Methylmercury in Fish*, MOTHERTOBABY (Nov. 1, 2017), available at <https://mothertobaby.org/factsheets/methylmercury-pregnancy/>.

¹¹ EPA, *Health Effects of Exposure to Mercury* (last visited May 15, 2019), available at <https://www.epa.gov/mercury/health-effects-exposures-mercury>.

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exposure levels.¹² Additionally, impacts of mercury may not be apparent at birth, rather, such impacts may be delayed in their presentation. Typically, lower levels of exposure can result in IQ deficits or less obvious effects on the brain,¹³ impairment of cognitive thinking, memory, attention, language, fine motor skills, and visual spatial skills.¹⁴ Such subtle effects may require sensitive neuropsychological testing to be diagnosed.¹⁵ On the other hand, exposure to methylmercury at extremely high levels may result in more pronounced effects such as, failure or delay in reaching developmental milestones, brain damage with severe mental handicaps, incoordination or inability to move, eventual blindness, involuntary muscle contractions or muscle weakness, seizures, and the inability to speak.¹⁶

Although older children and adults are less susceptible to mercury than infants in the womb, they are still vulnerable to the potentially adverse impacts of mercury exposure.¹⁷ Some symptoms of methylmercury poisoning in adults or children include, loss of peripheral vision, pins and needles feelings in the hands, feet, and/or around the mouth, lack of coordination of movements, impairments of speech, hearing and/or walking, and muscle weakness.¹⁸ Children poisoned by mercury may experience kidney damage as well as issues with their nervous and digestive systems.¹⁹

B. The Clean Air Act

The Clean Air Act (CAA, 42 U.S.C. 7401 *et seq.*) was created “to protect human health and the environment from emissions that pollute ambient, or outdoor, air” and has been amended many times.²⁰ Most notable, as it relates to the Mercury and Air Toxics Standards (MATS) rule, are the amendments of 1990. Among other things, the 1990 amendments made significant changes to two existing programs in Title I of the CAA—the National Ambient Air Quality Standards (NAAQS) and the National Emissions Standards for Hazardous Air Pollutants (NESHAP) program.²¹

Title I of the CAA requires that the Environmental Protection Agency (EPA) set NAAQS for the six criteria pollutants—carbon monoxide, sulfur dioxide, oxides of nitrogen, lead,

¹² CDC, *Public Health Statement Mercury*, Agency for Toxic Substances and Disease Registry (1999), available at <https://www.atsdr.cdc.gov/ToxProfiles/tp46-c1-b.pdf>.

¹³ *Id.*

¹⁴ EPA, *How People are Exposed to Mercury, Exposures to Methylmercury, How Does Mercury get into Fish and Shellfish*, (last visited May 15, 2019), available at <https://www.epa.gov/mercury/basic-information-about-mercury>.

¹⁵ *Id.*

¹⁶ CDC, *Public Health Statement Mercury*, Agency for Toxic Substances and Disease Registry (1999), available at <https://www.atsdr.cdc.gov/ToxProfiles/tp46-c1-b.pdf>.

¹⁷ EPA, *Basic Information About Mercury, What is Mercury*, (last visited May 15, 2019), available at <https://www.epa.gov/mercury/basic-information-about-mercury>.

¹⁸ *Id.*

¹⁹ EPA, *Basic Information About Mercury, What is Mercury* (last visited May 15, 2019), available at <https://www.epa.gov/mercury/basic-information-about-mercury>.

²⁰ James E. McCarthy, et al., Congressional Research Service, *Clean Air Act: A Summary of the Act and Its Major Requirements*, (Jan. 6, 2011), available at <https://fas.org/sgp/crs/misc/RL30853.pdf>.

²¹ EPA, *Overview by Section of CAA* (last visited May 16, 2019), <https://www3.epa.gov/airtoxics/overview.html>.

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particulates, and ozone. Some of the standards and programs in the CAA targeting the six criteria pollutants include New Source Review, New Source Performance Standards (NSPS), and State Implementation Plans (SIPs).²²

Section 112 of the CAA requires that the EPA promulgate regulations establishing emission standards for hazardous air pollutants (HAP) listed in Section 112(c).²³ More specifically, section 112 requires that the EPA establish Maximum Achievable Control Technology (MACT) standards for sources of the 187 hazardous air pollutants (HAPs) listed in the CAA, and specify categories of sources that will be subject to these emission standards.²⁴ The agency “is required to set standards for sources of the listed pollutants that achieve “the maximum degree of reduction in emissions” taking into account cost and other non-air-quality factors.”²⁵ EPA must revise these standards at least every eight years and on its own initiative, or in response to a petition, EPA can add or delete substances or source categories from the lists.²⁶

Under section 112(c) of the CAA, the EPA is required to publish and regularly update “a listing of all categories and subcategories of major and area sources that emit HAPs.”²⁷ Section 112(n) requires EPA to study further HAP emissions from certain entities before engaging in a rulemaking process. Specifically, the EPA must “perform studies concerning HAP emissions and control technologies from electric utility steam-generating units, coke oven production, and publicly-owned treatment works” that included “a study of mercury, associated emissions, health and environmental effects, and control technologies for mercury.”²⁸

C. History of Mercury and Air Toxics Standards (MATS) Regulation

The history of the MATS regulation dates back to the 1990 Clean Air Act Amendments. Pursuant to Section 112(n)(1) of the CAA as amended in 1990, the EPA was required to conduct studies on coal- and oil-fired electric utility steam generating units (EGUs) to inform the EPA’s decision on whether it was “appropriate and necessary” to regulate EGUs under section 112 of the CAA.²⁹ These studies included a study to evaluate “the hazards to public health reasonably anticipated to occur as the result of HAP emissions from EGUs after imposition of the requirements of the CAA” (the “Utility Study”) and a study to “consider the rate and mass of [mercury] emissions, the health and environmental effects of such emissions, technologies which

²² *Id.*

²³ *Id.*

²⁴ *Id.*; The 1990 amendments specified 189 pollutants, but P.L. 102-187, enacted on December 4, 1991, deleted hydrogen sulfide from the list of toxic pollutants, leaving only 188. On December 19, 2005, EPA removed methyl ethyl ketone (MEK) from the list of toxic air pollutants. The total number of listed air toxics is now 187.

²⁵ *Id.*

²⁶ James E. McCarthy, et al., Congressional Research Service, *Clean Air Act: A Summary of the Act and Its Major Requirements*, (Jan. 6, 2011), available at <https://fas.org/spp/crs/misc/RL30853.pdf>; EPA, *Summary of the Clean Air Act* (last visited May 16, 2019), available at <https://www.epa.gov/laws-regulations/summary-clean-air-act>.

²⁷ EPA, *Overview by Section of CAA* (last visited May 16, 2019), <https://www3.epa.gov/airtoxics/overview.html>.

²⁸ *Id.*

²⁹ See Clean Air Act § 112(n).

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are available to control such emissions, and the costs of such technologies” (the “Mercury Study”). The third required study was a report by the National Institute of Environmental Health Sciences (NIEHS) that “determine[d] the threshold level of Hg exposure below which adverse human health effects are not expected to occur.”³⁰ The purpose of these studies was for the results to inform the EPA’s decision regarding whether it was “appropriate and necessary” to regulate EGUs under section 112 of the CAA.

The EPA issued the “Mercury Study” required under section 112 of the CAA to Congress in December 1997.³¹ Among other things, the study found that “[m]ost of the [mercury] in the atmosphere is elemental [mercury] vapor, which circulates in the atmosphere for up to a year, and therefore can be widely dispersed and transported thousands of miles from likely sources of emission.”³² Further, according to the Study, “current anthropogenic emissions were only one part of the [mercury] cycle” and “the flux of [mercury] from the atmosphere to land or water at any one location is comprised of contributions from the natural global cycle, including re-emissions from the oceans, international sources, regional sources, and local sources.”³³ The “Study also found that fish consumption dominates the pathway for human and wildlife exposure to [methylmercury] and that there was a plausible link between anthropogenic releases of [mercury] from industrial and combustion sources in the U.S. and [methylmercury] in fish.”³⁴ In the Study, “EPA explained that, given the current scientific understanding of the environmental fate and transport of this element, it was not possible to quantify how much of the [methylmercury] in fish consumed by the U.S. population results from U.S. anthropogenic emissions, as compared to other sources of [mercury] (such as natural sources and re-emissions from the global pool).”³⁵

The EPA issued the “Utility Study” required under section 112 to Congress in February 1998.³⁶ As part of the study, EPA collected HAP emissions test data from 52 EGUs and that data, along with facility specific information, was used to estimate HAP emissions from all 684 utility facilities.³⁷ EPA determined that 67 HAP were emitted from EGUs and the agency conducted a screening level assessment of those HAP to prioritize the list of pollutants for further analysis. There were 14 HAP identified as priority for further assessment – 12 were identified based on inhalation exposure and risk and six, including mercury, were identified for multipathway assessment of exposure and risk.³⁸ Based on the assessment, EPA determined that mercury from coal-fired EGUs was the HAP of greatest concern. In addition, the Study evaluated HAP emissions based on two scenarios – a 1990 base year and 2010 projected

³⁰ 76 Fed. Reg. 24976, 24982 (May 3, 2011).

³¹ EPA, *Mercury Study Report to Congress, Volume 1. Executive Summary* (Dec. 1997), available at <https://www.epa.gov/sites/production/files/2015-09/documents/volume1.pdf>.

³² 76 Fed. Reg. 24976 (May 3, 2011).

³³ *Id.*

³⁴ *Id.*

³⁵ *Id.*

³⁶ *Id.*

³⁷ *Id.*

³⁸ *Id.*

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emissions. EPA selected the 2010 scenario “to meet the section 112(n)(1)(A) mandate to evaluate hazards “after imposition of the requirements of the Act.”³⁹

In addition to the reports required under section 112(n) of the CAA as amended in 1990, Congress, in conference report language associated with the EPA’s Fiscal Year (FY) 1999 appropriations, directed EPA to fund the National Academy of Sciences (NAS) to perform an independent study on the toxicological effects of methylmercury and to prepare recommendations on the establishment of a scientifically appropriate methylmercury exposure reference dose.⁴⁰ In addition, Congress indicated that the EPA should not make the appropriate and necessary regulatory determination for mercury emissions until EPA reviewed the results of the NAS study.⁴¹ NAS conducted an 18-month study examining the health effects of methylmercury and reported the findings of the study to EPA in July 2000.⁴²

At the end of the Clinton Administration in December 2000, the EPA issued a notice of regulatory finding making nine conclusions based on the information in the record and finding that it was appropriate and necessary to regulate EGUs under section 112 of the CAA.⁴³ In the finding, the EPA explained, among other things, that “it was appropriate to regulate HAP emissions from coal- and oil-fired units because it had identified certain control options that, it anticipated, would effectively reduce HAP from such units.”⁴⁴ Moreover, “[o]nce EPA determined that it was ‘appropriate’ to regulate coal- and oil-fired EGUs under CAA section 112, EPA next concluded that it was also ‘necessary’ to regulate HAP emissions from such units under section 112 ‘because the implementation of other requirements under the CAA will not adequately address the serious public health and environmental hazards arising from such emissions identified in the Utility RTC and confirmed by the NAS Study, and which section 112 is intended to address.’”⁴⁵

As a result, on December 20, 2000, EPA issued a finding pursuant to CAA section 112(n)(1)(A) that it was appropriate and necessary to regulate coal- and oil-fired electric utility steam generating units (EGUs) under the CAA section 112 and added EGUs to the CAA section 112(c) list of source categories that must be regulated.⁴⁶

In January 2004, during the George W. Bush Administration, EPA proposed to reverse the Clinton Administration’s “necessary and appropriate finding” and regulate mercury under a different section of the CAA—section 111. At that time, “EPA proposed section 112 standards for [mercury] emissions from coal-fired EGUs and nickel emissions from oil-fired EGUs, and, in

³⁹ *Id.*

⁴⁰ H.R. Conf. Rep. No. 105-769, at 281-282 (1998). National Research Council (NAS), *Toxicological Effects of Methylmercury*, Committee on the Toxicological Effects of Methylmercury, Board on Environmental Studies and Toxicology, National Research Council (2000).

⁴¹ 76 Fed. Reg. 24976, 24982 (May 3, 2011).

⁴² *Id.*

⁴³ 65 Fed. Reg. 79825 (Dec. 20, 2000).

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

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the alternative, proposed to remove EGUs from the section 112 list based on a finding that it was neither appropriate nor necessary to regulate EGUs under this section of the [CAA]. EPA also proposed to regulate mercury from coal-fired EGUs under CAA section 111.

In March 2005, “EPA issued a final revision of the appropriate and necessary finding from coal- and oil-fired EGUs and removed such units from the section 112 list.”⁴⁷ Ultimately, EPA did not finalize the proposed section 112 standards for mercury and nickel, but EPA did finalize the regulation under section 111 to reduce mercury emissions from coal-fired EGUs. In February 2008, the D.C. Circuit vacated both the action to remove EGUs from the section 112 list and the section 111 rule to limit mercury emissions.⁴⁸ The D.C. Circuit “determined that EPA violated the CAA by removing EGUs from the 112 list” and EGUs remained a section 112(c) listed source category.⁴⁹

During the Obama Administration, the EPA reinstated the “necessary and appropriate” finding and proceeded to regulate mercury under section 112. On March 16, 2011, the EPA issued a proposed rule proposing the National Emission Standards for Hazardous Air Pollutants (NESHAPs) for EGUs under section 112 of the CAA and proposing revised new source performance standards (NSPS) for fossil fuel-fired EGUs under CAA section 111(b).⁵⁰ On December 21, 2011, EPA announced a final rule to limit mercury, acid gases, and other toxic pollution from power plants.⁵¹ The final rule, entitled “National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electricity Utility, Industrial-Commercial-Institutional, and Small Industrial Commercial-Institutional Steam Generating Units” was published in the Federal Register on February 16, 2012, and was to become effective in April 2012.⁵² EPA refers to these as the “Mercury and Air Toxics Standards,” or “MATS” and the rule is also known as the “Utility MACT” rule. The Utility MACT rule set new hazardous air pollutant emissions limits, known as Maximum Achievable Control Technology (MACT) standards, for coal and oil-fired power plants, as well as New Source Performance Standards (NSPS) for electric generating units for particulate matter, sulfur dioxide, and nitrogen oxides.⁵³

EPA, however, interpreted the statutory phrase “appropriate and necessary” in a way that precluded them from considering cost when deciding whether to regulate power plants under the

⁴⁷ EPA, *Fact Sheet, Mercury and Air Toxics Standards for Power Plants*, available at <https://www.epa.gov/sites/production/files/2015-11/documents/20111221matssummaryfs.pdf>.

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ 76 Fed. Reg. 24976 (May 3, 2011).

⁵¹ EPA, *Mercury and Air Toxics Standards, EPA Announces Mercury and Air Toxics Standards (MATS) for Power Plants – Technical Information*, (last visited May 16, 2019) available at <https://www.epa.gov/mats/epa-announces-mercury-and-air-toxics-standards-mats-power-plants-technical-information>.

⁵² 77 Fed. Reg. 9304.

⁵³ EPA, *Regulatory Impact Analysis of the Proposed Toxics Rule: Final Report* (Mar. 2011), available at <https://www3.epa.gov/ttn/ecas/regdata/RIAs/ToxicsRuleRIA.pdf>; EPA, *Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards* (Dec. 2011), available at <https://www.epa.gov/sites/production/files/2015-11/documents/matsriafinal.pdf>.

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NESHAP program.⁵⁴ A group of 23 states along with industry groups challenged the final rule in the D.C. Circuit because the EPA did not consider cost in promulgating the rule.⁵⁵ A divided panel of the D.C. Circuit upheld EPA's decision not to consider cost, and the Supreme Court granted certiorari. The Supreme Court reversed the D.C. Circuit's decision, with Justice Scalia writing for majority, and remanded the rule back to the EPA for further consideration.⁵⁶ Justice Scalia explained that two fundamental administrative law doctrines governed—*State Farm* and *Chevron*—and by applying these principles, the Court found that because the phrase “appropriate and necessary” requires at least some attention to cost, EPA's interpretation that the cost of implementing the regulation did not need to be considered in the rulemaking process violated the aforementioned administrative law doctrines.⁵⁷

In response to *Michigan v. EPA*, EPA issued a supplemental “appropriate and necessary” finding in April 2016 based on its review of the 2012 rule's estimated costs.⁵⁸ In the 2016 Supplemental Finding, the EPA used two approaches, finding in each that the cost-benefit analysis supported the MATS regulation:

The first and preferred approach evaluated whether compliance costs were reasonable based on the industry's historical annual revenues and capital expenditures, retail electricity rates, and potential impacts on reliability. The second approach involved a direct comparison of the estimated compliance costs and the estimated benefits, which included co-benefits. The 2016 Supplemental Finding concluded that under both approaches, it is appropriate and necessary to regulate HAPs, including mercury, from power plants after considering regulatory costs.⁵⁹

With respect to the cost-benefit analysis approach put forth by the EPA, the agency justified finding that it is “appropriate” to regulate HAPs emissions from EGUs in part by looking at the co-benefits. In doing so, “the EPA estimated that the final MATS would yield total annual monetized benefits (in 2007 dollars) of between \$37 billion to \$90 billion using a 3-percent discount rate and \$33 billion to \$81 billion using a 7-percent discount rate in addition to many categories of unquantified benefits in comparison to the projected \$9.6 billion in annual costs.”⁶⁰ In these estimated benefits, however, “[n]early all of the monetized benefits were from

⁵⁴ 77 Fed. Reg. 9304, 9363 (Feb. 16, 2012). EPA found regulation “appropriate” because power plants' emissions of hazardous air pollutants posed serious health risks, and a number of control options were available to reduce those emissions; *New Jersey v. EPA*, 517 F.3d 574, 580, 583 (D.C. Cir. 2008). It found regulation “necessary” because the Act's other requirements had failed to sufficiently reduce the health risks.

⁵⁵ *White Stallion Energy Ctr., LLC v. EPA*, 748 F.3d 1222, 1233 (D.C. Cir. 2014) (per curiam).

⁵⁶ Justice Scalia was joined by Chief Justice Roberts, as well as Justices Kennedy, Thomas, and Alito. Justice Thomas also filed a concurrence in which he questioned the constitutionality of *Chevron* deference. See *Michigan v. EPA*, 135 S. Ct. at 2712–14 (Thomas, J., concurring).

⁵⁷ 129 Harv. L. Rev. 311, Environmental Law, *Michigan v. EPA* (Nov. 2015), available at <https://harvardlawreview.org/2015/11/michigan-v-epa/>.

⁵⁸ 81 Fed. Reg. 24420 (Apr. 25, 2016).

⁵⁹ *Id.*

⁶⁰ *Id.*

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the rule's particulate matter co-benefits.”⁶¹ The benefits from HAPS emission reductions alone were estimated at up to \$6 million annually.⁶²

D. EPA's Recent Actions Relating to the MATS Regulation

The 2016 Supplemental Finding was challenged in 2016 in *Murray Energy Corporation v. EPA*. The case is still pending; however, the D.C. Circuit Court is “holding the case in abeyance to allow time for the Trump Administration to review the finding and related legal framework.”⁶³

On December 27, 2018, the EPA issued a proposed rule relating to NESHAPs for EGUs.⁶⁴ In the federal register notice, the EPA makes four proposals: (1) to determine that it is not “appropriate and necessary” to regulate HAP emissions from coal- and oil-fired EGUs plans under section 112 of the CAA; (2) to keep coal- and oil-fired EGUs as a source category on the CAA Section 112(c) list of sources that must be regulated under section 112(d) of the CAA, thereby keeping the emission standards and other requirements of the MATS rule in place for coal- and oil-fired power plants; (3) to solicit comment on whether the Agency has the authority and/or obligation to delist EGUs from section 112(c) of the CAA and rescind the NESHAP for coal- and oil-fired EGUs; and (4) to propose the results of the residual risk and technology review (RTR) of the NESHAP for coal- and oil-fired EGUs.⁶⁵ After publishing the proposed rule in the federal register on February 7, 2019, the EPA held a public hearing on the proposals on March 18, 2019, and collected public comments on the proposal until April 17, 2019.⁶⁶

The EPA proposes to revise the “appropriate and necessary” finding in response to the Supreme Court’s decision in *Michigan v. EPA* requiring that the Agency consider cost when deciding whether it is appropriate and necessary under section 112 of the CAA to regulate HAP emission from coal- and oil-fired EGUs.⁶⁷ The EPA concluded that the 2016 Supplemental Finding was flawed in a number of ways, including because the “preferred approach” in the

⁶¹ Kate Shouse, Congressional Research Service, *EPA Reconsiders Basis for Mercury and Air Toxics Standards* (Jan. 18, 2019), available at <https://fas.org/sgp/crs/misc/IF11078.pdf>.

⁶² Anne E. Smith testimony, Hearing before the Subcommittee on Energy and Power, Committee on Energy and Commerce on *The American Energy Initiative – A Focus on What EPA's Utility MACT Rule Will Cost U.S. Consumers*, Feb. 8, 2012 (112th Cong., serial no. 112-113).

⁶³ Britt Speyer Fleming and Stephen C. Fotis, *EPA Reconsiders Cost Justification for MATS and Proposes No Additional Requirements for Power Plants*, THE NATIONAL LAW REVIEW (Jan. 9, 2019), available at <https://www.natlawreview.com/article/epa-reconsiders-cost-justification-mats-and-proposes-no-additional-requirements>.

⁶⁴ EPA, Mercury and Air Toxics Standards, Regulatory Actions – Final Mercury and Air Toxics Standards (MATS) for Power Plants (Dec. 27, 2018), available at <https://www.epa.gov/mats/regulatory-actions-final-mercury-and-air-toxics-standards-mats-power-plants>.

⁶⁵ 84 Fed. Reg. 2670.

⁶⁶ U.S. Environmental Protection Agency, *Public Hearing Registration for Proposed Revised Supplemental Finding and Results of the Residual Risk and Technology Review* (last visited May 16, 2019), available at <https://www.epa.gov/mats/forms/public-hearing-registration-proposed-revised-supplemental-finding-and-results-residual>.

⁶⁷ 84 Fed. Reg. 2670, 2672.

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2016 Supplemental Finding—the “cost reasonableness” approach—disregarded the Supreme Court’s suggestion in *Michigan v. EPA* that the EPA “must meaningfully consider cost within the context of a regulation’s benefits” under section 112(n)(1) of the CAA.⁶⁸ More specifically, the EPA said that “[b]ecause the ‘cost reasonableness’ test failed to consider cost in a meaningful way relative to benefits, we, therefore conclude that approach did not adequately address the Supreme Court’s instruction that a reasonable regulation requires an agency to fully consider ‘the advantages and disadvantages’ of a decision.”⁶⁹

Furthermore, the EPA said that the “alternative approach” in the 2016 Supplemental Finding improperly considered co-benefits from non-HAP emission reductions. The EPA said that the “the EPA’s equal reliance on the particulate matter (PM) air quality co-benefits projected to occur as a result of the reduction in HAP was flawed as the focus of CAA section 112(n)(1)(A) is HAP emissions reductions.”⁷⁰ Moreover, the EPA said:

[I]t would be highly illogical for the Agency to make a determination that regulation under CAA section 112, which is expressly designed to deal with HAP, is justified principally on the basis of the criteria pollutant impacts of these regulations. That is, if the HAP-related benefits are not at least moderately commensurate with the cost of HAP controls, then no amount of co-benefits can offset this imbalance for purposes of a determination that it is appropriate to regulate under CAA section 112(n)(1)(A).⁷¹

Instead, in the current proposal, the EPA said that, after considering the cost of compliance relative to the HAP benefits of MATS, the Agency determined it was not “appropriate and necessary” to regulate coal- and oil-fired EGUs under section 112 of the CAA.⁷² To support this determination, the EPA stated:

The EPA has reexamined the cost analyses presented in the 2016 Supplemental Finding and proposes to determine that neither of the Finding’s approaches to considering cost satisfies the Agency’s obligation under CAA section 112(n)(1)(A) as interpreted by the Supreme Court in *Michigan*. Instead, we use a different consideration of cost for purposes of the appropriate and necessary finding, one that we believe aligns with the purpose of CAA section 112(n)(1)(A) as set forth in *Michigan*. We propose to directly compare the cost of compliance with MATS with the benefits specifically associated with reducing emissions of HAP as the primary inquiry in this finding, in order to satisfy our duty to consider cost in the context of CAA section 112(n)(1)(A). . . . In this action, the EPA proposes to conclude that it is not appropriate and necessary to regulate HAP from EGUs under CAA section 112 because the costs of such regulation grossly outweigh the HAP benefits. . . . A proper consideration of costs based on this approach demonstrates

⁶⁸ *Id.* at 2675.

⁶⁹ *Id.* at 2675.

⁷⁰ *Id.* at 2675-76.

⁷¹ *Id.* at 2676.

⁷² *Id.*

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that the total cost of compliance with MATS (\$7.4 to \$9.6 billion annually) dwarfs the monetized HAP benefits of the rule (\$4 to \$6 million annually). As discussed further below, while there are unquantified HAP benefits and significant monetized PM co-benefits associated with MATS, the Administrator has concluded that the identification of these benefits is not sufficient, in light of the gross imbalance of monetized costs and HAP benefits, to support a finding that it is appropriate and necessary to regulate EGUs under CAA section 112.⁷³

The Agency points to the statutory text of section 112(n)(1)(A) of the CAA and the Supreme Court's decision in *Michigan v. EPA* to justify focusing the "appropriate and necessary" decision on HAP-specific benefits and costs.⁷⁴ First, the EPA notes that the study required in section 112(n)(1)(A)—the "Utility Study"—directly focuses on the harms that will occur as a result of HAP emissions, and the EPA points out that Congress directed the "EPA to study HAP effects under CAA section 112 after other provisions of the CAA had been implemented" and that this "suggests that Congress envisioned that the judgment about whether additional regulation was appropriate and necessary should be predicated primarily on an assessment of HAP emissions from the source category."⁷⁵ Second, the EPA says that primarily considering the costs of MATS in contrast to the HAP benefits of hazardous pollution reductions from MATS—and not giving equal weight to non-HAP co-benefits in this comparison—is consistent with the overall structure of the CAA.⁷⁶ EPA noted:

Congress established a rigorous system for setting standards of acceptable levels of criteria air pollutants and wrote a comprehensive framework directing the implementation of those standards in order to address the health and environmental impacts associated with those pollutants. . . . [T]he vast majority of estimated monetized benefits resulting from MATS are associated with reductions in PM_{2.5} precursor emissions, principally NO_x and SO₂. Both NO_x and SO₂ are criteria pollutants and precursors to criteria pollutants that are already addressed by the cavalcade of statutory provisions governing levels of these pollutants, including the National Ambient Air Quality Standards (NAAQS) provisions that require the EPA to set standards for criteria pollutants requisite to protect public health with an adequate margin of safety, and by state, regional, and national rulemakings establishing control measures to meet those levels. To the extent that additional reductions of these criteria pollutants are necessary to protect public health, regulation explicitly targeted at these pollutants is best reserved for the NAAQS program, under which Congress provided the EPA ample authority to regulate.⁷⁷

While the EPA is proposing to find that it is not "appropriate and necessary" to regulate HAP emissions from coal- and oil-fired EGUs plans under section 112 of the CAA, the EPA is

⁷³ *Id.* at 2676-77.

⁷⁴ *Id.* 2677.

⁷⁵ *Id.* at 2677 (emphasis in original).

⁷⁶ *Id.* 2677.

⁷⁷ *Id.* at 2677.

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proposing to keep coal- and oil-fired EGU source category on the CAA section 112(c)(1) list and therefore keep the section 112(d) emission standards that were promulgated in 2012.⁷⁸ The EPA points to the D.C. Circuit Court's decision in *New Jersey v. EPA* (D.C. Cir. 2008) and notes that under this decision, "the EPA's determination that a source category was listed in error does not by itself remove a source category from the CAA section 112(c)(1) list—even EGUs, notwithstanding their special treatment under CAA section 112(n)."⁷⁹ Instead, the EPA must decide that the statutory criteria for delisting set forth in section 112(c)(9) have been satisfied before the Agency can remove a source category from the CAA section 112(c)(1) list.⁸⁰ In the proposal, the EPA asks for comments on its interpretation of the D.C. Circuit's decision in *New Jersey*.⁸¹

Finally, the EPA also proposed the results of the residual risk and technology review (RTR) of the NESHAP for coal- and oil-fired EGUs—which, under CAA, the EPA is required to conduct every 8 years.⁸²

E. Summary of Responses to the EPA's Current Proposal

The EPA collected public comment on its proposed revised Supplemental Cost Finding for MATS and the required RTR under the CAA, and the public comment period closed on April 17, 2019.⁸³ The EPA received nearly 500,000 comments on the Agency's proposal.⁸⁴ A high-level preliminary review of some of the comments received by the Agency on some of the proposals by the Agency—which are generalized and do not include positions on all of the proposals that the EPA made in the 2018 proposed rule—indicates that three categories of commenters include, but are not necessarily limited to, commenters that:

- (1) Oppose and/or express concerns with EPA's finding that it is not "appropriate and necessary" to regulate hazardous air pollutant (HAP) emissions from coal- and oil-fired EGUs plans under section 112 of the Clean Air Act (CAA) and support the EPA's decision to keep coal- and oil-fired EGUs as a source category on the CAA Section 112(c) list of sources that must be regulated under section 112(d) of the CAA;⁸⁵

⁷⁸ *Id.* at 2678.

⁷⁹ *Id.* at 2678.

⁸⁰ *Id.*

⁸¹ *Id.* 2678-79.

⁸² *Id.* at 2680.

⁸³ U.S. Environmental Protection Agency, *Public Hearing Registration for Proposed Revised Supplemental Finding and Results of the Residual Risk and Technology Review* (last visited May 16, 2019), available at <https://www.epa.gov/mats/forms/public-hearing-registration-proposed-revised-supplemental-finding-and-results-residual>.

⁸⁴ *National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units – Additional Post-Promulgation Actions*, Docket ID: EPA-HQ-OAR-2018-0794, REGULATIONS.GOV (last visited May 16, 2019), <https://www.regulations.gov/docket?D=EPA-HQ-OAR-2018-0794>.

⁸⁵ See, e.g., Letter from U.S. Chamber of Commerce to The Honorable Andrew Wheeler, Administrator, EPA, Docket ID No. EPA-HQ-OAR-2018-0794 (Apr. 17, 2019); Letter from Emily Sanford Fisher, General Counsel and

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- (2) Support EPA's finding that it is not "appropriate and necessary" to regulate hazardous air pollutant (HAP) emissions from coal- and oil-fired EGUs plans under section 112 of the Clean Air Act (CAA) and support the EPA's decision to keep coal- and oil-fired EGUs as a source category on the CAA Section 112(c) list of sources that must be regulated under section 112(d) of the CAA;⁸⁶ and
- (3) Support EPA's finding that it is not "appropriate and necessary" to regulate hazardous air pollutant (HAP) emissions from coal- and oil-fired EGUs plans under section 112 of the Clean Air Act (CAA) and oppose the EPA's decision to keep coal- and oil-fired EGUs as a source category on the CAA Section 112(c) list of sources that must be regulated under section 112(d) of the CAA.⁸⁷

In the second bucket of commenters—those that support the decision to remove the appropriate and necessary finding and the decision to keep EGUs as a source category on the CAA Section 112(c) list of sources—at least one commenter indicated that it was their understanding that the Supreme Court in *Michigan* “clearly directed the agency to determine whether the costs of regulation of HAP emissions outweigh the benefits” and it therefore was inappropriate for the EPA to heavily rely on co-benefits of fine particulate removal.”⁸⁸ Notably, during oral argument in *Michigan v. EPA*, Chief Justice John Roberts “questioned the ‘disproportionate’ nature of the mercury and air toxic rule’s PM-2.5 co-benefits, suggesting they might represent an ‘end run around’ national ambient air quality standards.”⁸⁹ Moreover, “the chief justice’s questioning focused on the appropriateness of a pollutant that already has its own regulatory framework taking on such a dominant role as a co-benefit for another type of pollutant.”⁹⁰

Corporate Secretary, Edison Electric Institute to the Honorable William L. Wehrum, Docket ID No. EPA-HQ-OAR-2018-0794 (Mar. 26, 2019).

⁸⁶ See, e.g., Letter from Scott A. Weaver, Director, Air Quality Services, American Electric Power, to Dr. Nick Hutson, Energy Strategies Group, Sector Policies and Program Division, EPA, Docket ID No. EPA-HQ-OAR-2018-0794 (Apr. 16, 2019); Letter from Brenda E. Brickhouse, Vice President, Environment and Energy Policy, The Tennessee Valley Authority, to Sir or Madam, EPA, Docket ID No. EPA-HQ-OAR-2018-0794 (Apr. 17, 2019).

⁸⁷ See, e.g., Letter from Murray Energy Corporation, to The Honorable Andrew Wheeler, Administrator, EPA, Docket ID No. EPA-HQ-OAR-2018-0794 (Apr. 17, 2019).

⁸⁸ Letter from Scott A. Weaver, Director, Air Quality Services, American Electric Power, to Dr. Nick Hutson, Energy Strategies Group, Sector Policies and Program Division, EPA, Docket ID No. EPA-HQ-OAR-2018-0794 (Apr. 16, 2019).

⁸⁹ Scott Bloomberg, *EPA's Particulate Matter Co-Benefits: A Case of Ever-Declining Credibility*, BLOOMBERG BNA (May 31, 2016), available at https://www.nera.com/publications/archive/2016/epa_s-particulate-matter-co-benefits--a-case-of-ever-declining-c.html.

⁹⁰ *Id.*

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Regulatory Policy

How agencies justify their rules is an area of growing focus, particularly as environmental economics has evolved to contemplate the co-benefits of rulemakings. In this piece, the NERA consultancy's Scott Bloomberg details why EPA's projections of regulatory impacts do not take cleaner air into account and do not appropriately acknowledge uncertainties.

EPA's Particulate Matter Co-Benefits: A Case of Ever-Declining Credibility



By SCOTT J. BLOOMBERG

Scott J. Bloomberg is a vice president in NERA Economic Consulting's Energy & Environment group. For almost 15 years, he has been evaluating the national and regional effects of proposed environmental regulations in the electricity sector. He is not related to Michael Bloomberg, owner and chief executive officer of Bloomberg LP.

Regulatory impact analyses are required for major federal regulations. A central feature of a regulatory impact analysis is comparison of a rule's estimated benefits to its estimated compliance costs. The benefits attributed to a rule may include "co-benefits"—beneficial impacts that are not the direct objective of the regulation. One might expect co-benefits to play only a subsidiary role in the justification for a new regulation. But the opposite has become the norm in impact analyses for EPA's air rules, in which direct benefits of each new rule are, more frequently than not, over-

whelmed by estimates of co-benefits from ambient fine particulate matter (PM-2.5).

The dominant role of PM-2.5 co-benefits in EPA's regulatory analyses has been questioned for many years, including in Supreme Court oral arguments last year regarding EPA's 2011 power plant rule on emissions of mercury and air toxics. In that case, *Michigan v. EPA*, Chief Justice John Roberts questioned the "disproportionate" nature of the mercury and air toxics rule's PM-2.5 co-benefits, suggesting they might represent an "end run around" national ambient air quality standards. The chief justice's questioning focused on the appropriateness of a pollutant that already has its own regulatory framework taking on such a dominant role as a co-benefit for another type of pollutant.

In this commentary, I wish to bring attention to a separate and additional concern related to the *credibility* of those co-benefit estimates. Issues also have been raised about the credibility of the mercury rule regulatory impact analyses co-benefits, but the point is that the credibility of PM-2.5 co-benefits also is declining as they accumulate in more and more impact analyses. The cause of the declining credibility lies in the inconsistent manner in which EPA calculates PM-2.5 co-benefits relative to EPA's ambient air standards determination and the fact that the air is getting cleaner.

This issue, while certainly present in the mercury impact analysis, is even more troubling in regulatory impact analyses submitted to the Office of Information and Regulatory Affairs since 2011. To make the point, the focus should be on one of the most recent impact analyses containing PM-2.5 co-benefits estimates—the Clean Power Plan or climate rule regulatory analysis finalized in 2015. The climate rule targets CO₂ emissions, so any benefits ascribed to CO₂ reductions would be "benefits," whereas any benefits attributable to reductions in other emissions (such as PM-2.5 and ozone precursors like SO₂ and NO_x) would be "co-benefits."

What Is the Nature of the Inconsistency?

In a recent article in the journal *Risk Analysis*, Anne Smith identifies inconsistencies between the way EPA calculates criteria pollutant benefits and co-benefits in its impact analyses and the reasoning that the EPA administrator applies when determining the level at which to set the air standards. Smith notes that co-benefits estimates are exceptionally susceptible to the credibility issues that arise from such inconsistency, pointing to both the mercury and the climate rule for power plants' co-benefits as examples.

As detailed in Smith's article, the Clean Air Act requires the air standards be set at a level that the EPA administrator determines is "requisite to protect the public health" with "an adequate margin of safety," based on the best available scientific evidence on health effects. But the epidemiological associations that are the basis for the PM-2.5 NAAQS are not able to define a clear point at which public health is protected (i.e., no threshold has yet been identified). In that situation, the EPA administrator turns to the question of "confidence" in the continuation of those associations below the observed range of concentrations to help draw a line:

In reaching decisions on alternative standard levels to propose, the administrator judged that it was most appropriate to examine where the evidence of associa-

tions observed in the epidemiological studies was strongest and, conversely, where she had appreciably less confidence in the associations observed in the epidemiological studies.

In 2013, after reviewing the scientific information, EPA set the annual PM-2.5 National Ambient Air Quality Standards at 12 $\mu\text{g}/\text{m}^3$ because the Administrator determined that to be the point...

... where her confidence in the magnitude and significance of the associations is reduced to such a degree that a standard set at a lower level would not be warranted to provide requisite protection that is neither more nor less than needed to provide an adequate margin of safety.

These "associations" are the very foundation of EPA's co-benefits calculations, and thus the above statement strongly implies a near-zero confidence in continued health risks calculated at ambient concentrations of PM_{2.5} below the ambient air quality standards. Logically, this can be translated to mean that the expected health risk change from a given unit of change in PM-2.5 at an ambient PM-2.5 concentration of 5 $\mu\text{g}/\text{m}^3$ would be significantly less than from the same unit of change starting at 13 $\mu\text{g}/\text{m}^3$.

As demonstrated in Smith's article, however, EPA's methodology for calculating health co-benefits ignores this lack of confidence in health risks continuing below the level of the PM-2.5 air standard, and instead assigns an equal confidence (i.e., 100 percent confidence) that the PM-2.5-mortality associations hold true all the way down to a zero concentration. This is the primary source of EPA's inconsistency with the air standard determination, and she explains how this results in substantial overstatement of expected benefits, particularly in the case of PM-2.5 health co-benefits.

Overstatement of PM-2.5 Co-Benefits Increasing

Smith's article notes that this overstatement is extremely large when the calculation is for co-benefits rather than direct benefits of the air quality standard itself, citing the co-benefits in the mercury and climate rule as two recent examples. She does not, however, note that the degree of overstatement is even larger for the climate rule than the mercury case. However, that is the logical implication of the inconsistency problem. As the ambient air in the U.S. gets cleaner, a greater share of the population will be living in areas where confidence in the continued association between PM_{2.5} and mortality is near zero. Thus, the degree of overstatement in co-benefits estimates from one regulatory analysis to the next has been increasing over time and will continue to do so. Let's illustrate how this works using these same two regulatory impact analyses.

In both the mercury and climate rule impact analyses, EPA estimated PM-2.5 co-benefits in the tens of billions of dollars per year. The diminished confidence of the EPA Administrator that the PM-2.5-mortality association continues below the ambient air quality standard, however, is not reflected in any manner in EPA's calculations of these co-benefits.

For the mercury rule, these co-benefits accounted for more than 99 percent of total benefits, which was the basis for Chief Justice Roberts' concern regarding their "disproportionate" share. Their inclusion was the only

reason EPA could justify the rule on a benefit-cost basis. In the CPP, approximately 50 percent of total benefits is attributable to co-benefits, primarily from PM-2.5, but also from ozone. While the share of total benefits attributable to co-benefits is lower in the climate than in the mercury rule, the climate rule's co-benefits estimates are actually more unreliable.

In the mercury RIA, EPA provides data showing that essentially all of the co-benefits are associated with avoided deaths in areas projected to already be below the annual PM-2.5 standard of $12 \mu\text{g}/\text{m}^3$ (89 percent are below $10 \mu\text{g}/\text{m}^3$ and 27 percent are below $7.5 \mu\text{g}/\text{m}^3$). EPA did not provide similar information for the climate rule, but in a recent study for the Virginia Department of Environmental Quality, NERA determined that 99 percent of the 2025 PM-2.5 precursor emission reductions in the proposed climate rule were projected to occur in counties with an expected PM-2.5 concentration in 2020 less than $12 \text{ ig}/\text{m}^3$, of which 97 percent are below $10 \text{ ig}/\text{m}^3$ and 55 percent are below $7.5 \mu\text{g}/\text{m}^3$.

Thus, compared to the mercury co-benefits, the proposed climate rule has double the co-benefits in areas with expected PM-2.5 concentrations very far below the ambient air quality standards (55 percent versus 27 percent in areas less than $7.5 \text{ ig}/\text{m}^3$), while the fraction of co-benefits in areas at least 15 percent below the air standard (i.e., less than $10 \text{ ig}/\text{m}^3$) has also increased substantially (i.e., to 97 percent from 89 percent). The simple reason for this is that the mercury co-benefits were based on air quality projected in 2015, while the Clean Power Plan co-benefits were based on air quality from 2020 and later—a much cleaner environment due to a very large number of emissions regulations poised to take effect after 2015.

While some, including Chief Justice Roberts, have questioned the "legitimacy" of EPA's co-benefits in the mercury rule, the PM-2.5 co-benefits in the climate rule

are even more unreliable and overstated because a far greater share of those co-benefits are associated with ever lower PM-2.5 concentrations for which the EPA itself has significantly reduced confidence in PM-2.5-mortality associations. The continuing decline of SO_2 and NO_x emissions, and hence, ambient PM-2.5 concentrations, over time will continue to increase the degree of overstatement of EPA's PM-2.5 co-benefits in each incremental air regulatory impact analysis going forward.

Conclusion

Smith's article in *Risk Analysis* has brought attention to the fact that the PM-2.5 co-benefits that pervade EPA's regulatory analyses for air standards are misleadingly presented because they do not reflect EPA's own diminished confidence in risks in areas of the country with air quality that already easily meets EPA's own public health standards. Her article cites the co-benefits in the mercury and climate impact analyses as examples. This commentary explains how the PM-2.5 co-benefits in each successive new regulatory analysis are becoming less credible, as they are increasingly affected by the inconsistencies first described by Smith. This situation can lead to false benefit-cost comparisons, particularly as EPA has been relying on health co-benefits for an increasing share of its total benefits over the last decades.

Until EPA's method for assessing benefits in its regulatory impact analyses is made to be consistent with its own regulatory determinations, one can only expect criteria pollutant co-benefits to become even more overstated and unreliable over time. While the mercury rule impact analysis is a prime example of excessive overreliance on co-benefits, the co-benefits EPA has attributed to the regulatory analysis of the Clean Power Plan are subject to an even greater degree of overstatement.

Inconsistencies in Risk Analyses for Ambient Air Pollutant Regulations

Anne E. Smith*

This article describes inconsistencies between health risk analyses that the U.S. Environmental Protection Agency (EPA) uses to support its decisions on primary National Ambient Air Quality Standards (NAAQS), and in the associated Regulatory Impact Analyses (RIAs) that accompany each NAAQS rulemaking. Quantitative risk estimates are prepared during the NAAQS-setting deliberations using inputs derived from statistical associations between measured pollutant concentrations and health effects. The resulting risk estimates are not directly used to set a NAAQS, but incorporated into a broader evidence-based rationale for the standard that is intended to demonstrate conformity with the statutory requirement that primary NAAQS protect the public health with a margin of safety. In a separate process, EPA staff rely on the same risk calculations to prepare estimates of the benefits of the rule that are reported in its RIA for the standard. Although NAAQS rules and their RIAs are released simultaneously, the rationales used to set the NAAQS have become inconsistent with their RIAs' estimates of benefits, with very large fractions of RIAs' risk-reduction estimates being attributed to populations living in areas that will already be attaining the respective NAAQS. This article explains the source of this inconsistency and provides a quantitative example based on the 2012 revision of the fine particulate matter (PM_{2.5}) primary NAAQS. This article also demonstrates how this inconsistency is amplified when criteria pollutant co-benefits are calculated in RIAs for non-NAAQS rules, using quantitative examples from the 2011 Mercury and Air Toxics Standards and the currently proposed Clean Power Plan.

KEY WORDS: Benefits; co-benefits; NAAQS; ozone; PM_{2.5}; regulatory impact analysis

1. BACKGROUND

When the primary particulate matter (PM_{2.5}) National Ambient Air Quality Standards (NAAQS) were first established in 1997 (one for annual average and one for daily average ambient PM_{2.5} concentrations), the principal basis for those standards was epidemiological evidence of positive statistical associations between ambient PM_{2.5} levels and adverse health effects, including premature death risk.

These reported associations, combined with a presumption that they represented a causal relationship, were also used to calculate quantitative public health risk estimates to supplement reasoning on setting the NAAQS. Quantitative risk analyses based on epidemiological evidence have continued to be a central feature of the review process for revisions of the PM_{2.5} NAAQS since then, and have also been a salient consideration in revisions of the NAAQS for ozone. This article focuses on a quantitative inconsistency that has emerged between the rationale that U.S. Environmental Protection Agency (EPA) Administrators use for setting a NAAQS when relying primarily on epidemiologically-based health risk evidence, and the estimates of public health benefits

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from those rules that EPA staff produces in its Regulatory Impact Analyses (RIAs).¹

2. THE RATIONALE FOR SETTING A PRIMARY NAAQS

The Clean Air Act requires EPA² to set the primary NAAQS for each criteria pollutant at levels that “are requisite to protect the public health” while “allowing an adequate margin of safety.”⁽¹⁾ This determination must be made without regard to the potential cost of meeting the standard,⁽²⁾ and legal rationales for choosing a NAAQS traditionally involved a balanced consideration of three attributes: (1) size of affected population, (2) severity of effect, and (3) certainty of effect.⁽³⁾ However, the evolution since 1997 towards greater reliance on epidemiological evidence in setting a NAAQS forced a shift in how the rationale could be constructed, particularly for PM_{2.5}. This was because the available epidemiological studies on several clearly adverse types of health effects (such as premature death) have not been able to identify a “threshold” or any other less sharp delineation of a point where the risk per unit increment of concentration appears to attenuate.³ This situation eliminates the first two of the three above-mentioned considerations that EPA had typically relied on in

NAAQS-setting rationales. That is, (1) the entire U.S. population is now implicated as at risk at every potential NAAQS level, and (2) the severity of effect can no longer be seen to be changing as lower potential NAAQS levels are considered. As a result, consideration (3)—uncertainty about the reliability of the epidemiologically estimated association—has become the only consideration remaining available to EPA for setting a primary NAAQS above zero that can be argued to be adequately protective of the public health as required by the statute.

This shift in the nature of the scientific evidence for setting a NAAQS was so profound that the U.S. Court of Appeals ruled that the setting of a NAAQS under these circumstances amounted to an unconstitutional delegation of legislative power to the Administrator unless she would first articulate an “intelligible principle” for how to draw that line.⁽⁶⁾ However, the Supreme Court overruled this finding,⁽⁷⁾ with the result being that since then EPA’s rationales for at least two of the NAAQS (i.e., PM_{2.5} and ozone) have largely emphasized identifying a level at which continuation of the nonthreshold statistical health associations becomes too uncertain to indicate an actionable level of further public health risk.

The preamble for the 2012 PM_{2.5} NAAQS decision provides an example. It starts by noting that setting a standard based on epidemiological studies that cannot identify a population threshold requires a decision-making approach that “includes consideration of how to weigh the uncertainties in the reported associations across the distributions of PM_{2.5} concentrations in the studies and the uncertainties in quantitative estimates of risk, in the context of the entire body of evidence before the Agency.”⁽⁸⁾ Later, the document states, “[i]n reaching decisions on alternative standard levels to propose, the Administrator judged that it was most appropriate to examine where the evidence of associations observed in the epidemiological studies was strongest and, conversely, where she had appreciably less confidence in the associations observed in the epidemiological studies,”⁽⁹⁾ and after a detailed discussion of the epidemiological information states, “[t]he Administrator views this information as helpful in guiding her determination as to *where her confidence in the magnitude and significance of the associations is reduced to such a degree* [emphasis added] that a standard set at a lower level would not be warranted to provide requisite protection that is neither more nor

¹A separate point of discussion regarding the quantitative risk estimates is whether the full body of scientific evidence is sufficient to give confidence that these epidemiological associations reflect a causal relationship between the pollutant and health endpoint studied. This article does not attempt to add to that discussion.

²Formally, under the Clean Air Act, the responsibility for deciding where to set a NAAQS is vested specifically in the Administrator. Throughout this article, when I use the term “EPA,” I am referring to the EPA Administrator. When not referring to the Administrator specifically, I use the terms “EPA staff” or “Agency.”

³EPA staff and others often refer to this as a “threshold” for effects, but the phenomenon being sought to help identify a protective level for a particular adverse effect need not be a point of sharp delineation where all population-wide effects end. Even evidence of diminishment in the slope of the association would be helpful but has not been consistently found. Lack of detection of such a diminishment in an association, even if the detected association is causal at relatively high concentrations, does not mean one does not exist at some relatively low concentration (see Ref. 4, p. 382). This is because the epidemiological techniques available have very limited ability to reliably discern the shape of a potential concentration-response relationship, and thus to inform the question of where or whether the association may end. It is theoretically established that unavoidable inaccuracies in measurement of an explanatory variable (e.g., pollutant exposure) make it difficult to statistically detect a threshold or other non-linearity at low concentrations even when it actually exists.⁽⁵⁾

less than needed to provide an adequate margin of safety.”⁽¹⁰⁾

Similarly, in 2008 EPA used lack of confidence in continuation of the epidemiological associations to lower levels as its rationale for not setting the ozone NAAQS lower than 0.075 ppm despite clinical evidence in the record of health responses at yet lower concentrations. The ozone NAAQS preamble states: “A standard set at a level lower than 0.075 would only result in significant further public health protection if, in fact, there is a continuum of health risks in areas with 8-hour average O₃ concentrations that are well below the concentrations observed in the key controlled human exposure studies and if the reported associations observed in epidemiological studies are, in fact, causally related to O₃ at those lower levels. Based on the available evidence, the Administrator is not prepared to make these assumptions. Taking into account the uncertainties that remain in interpreting the evidence from available controlled human exposure and epidemiological studies at very low levels, the Administrator notes that *the likelihood of obtaining benefits to public health with a standard set below 0.075 ppm O₃ decreases* [emphasis added], while the likelihood of requiring reductions in ambient concentrations that go beyond those that are needed to protect public health increases.”⁽¹¹⁾ The U.S. Court of Appeals for the District of Columbia Circuit accepted this rationale and upheld the standard in 2013.⁽¹²⁾

Although the NAAQS rationales are not written to conform to the terminology of probability or expected values, readers with decision analytic or other risk analysis training would be inclined to interpret the above quotes as expressing subjective judgments about the probability that the health relationships apparent in statistical associations cease to exist at some point on the continuum of lower and lower ambient pollutant concentrations. A decision-analytic interpretation of the above statements might be as follows. In order for a selected NAAQS level to be deemed as requisite to protect the public health, EPA’s subjective probability that the relationship exists at and below the selected NAAQS level must, logically, be very nearly zero. (Indeed, the subjective probability of continued effects must fall to nearly zero at an ambient concentration somewhere *above* the selected NAAQS level. This is because the NAAQS needs to include at least some margin of safety, and thus must be set at least somewhat lower than the level where expected risk is deemed to

become too small to be considered a public health concern.)

3. THE RESULTING INCONSISTENCY IN BENEFITS ESTIMATES FOR A NAAQS

Thus, in setting NAAQS using epidemiological evidence, EPA has deemed quantitative estimates of health risks for concentrations below the NAAQS far less reliable and more inaccurate than the numerical precision with which they are reported. In essence, the NAAQS rationales give little or no weight to the subset of the quantitative risk estimates the Agency has placed in the record that have been calculated for pollutant concentrations below the selected NAAQS level. This lack of confidence in risk estimates from that below-the-NAAQS range does not, however, make its way into the RIAs that accompany the release of the final rules.

RIAs are documents that report on the benefits and costs of each major new regulation, such as a revised NAAQS. Federal regulatory agencies are required to prepare RIAs by Executive Order of the President.^(13,14) Although this requirement is unrelated to the legal requirements of the statute that motivates the regulation (such as the Clean Air Act in the case of air pollutant regulations), EPA’s RIAs for air regulations adopt the same epidemiologically-based method of quantifying health risks used when deliberating where to set the NAAQS.⁴ The consistency ends there, however. At the same time that EPA is setting NAAQS at levels where it has minimal confidence that the public health is affected at lower concentrations, the Agency’s RIAs are giving the same weight to risks calculated for population exposures *below* the NAAQS level as they do to risks calculated for population exposures *above* the NAAQS level. That is, RIAs assume elevated hazards exist with 100% certainty for all ambient pollutant exposure levels down to a zero concentration, inconsistent with EPA’s judgments (formed when assessing those pollutants’ hazards), which imply nearly 0% certainty. EPA does not explain or try to justify why data that are too uncertain to use in the NAAQS preamble context are certain enough to use in the RIA context. Although different certainty standards may be

⁴While the “benefits” in an RIA are stated as a monetary value to be compared to the regulation’s costs, they are directly derived from quantitative estimates of physical health effects.

justified in the context of decisions with different consequences, the contexts of a NAAQS preamble and that NAAQS's RIA are not very different at all.

This inconsistency was not always as pronounced as it is now. Until 2009, risk reduction calculations used in air RIAs were at least truncated for pollutant concentrations below the lowest concentration level measured in the epidemiological study being used to make the risk estimates. RIAs would still include risk reduction estimates below the prevailing NAAQS level, as NAAQS levels have always been set at levels above the lowest levels measured in the studies. However, from 2009 onwards, RIAs eliminated even that truncation, which resulted in a sudden and large increase in RIA benefits estimates for PM_{2.5} and ozone pollutant changes.⁽¹⁵⁾ The fact that RIAs calculate health risk reductions below the NAAQS, and now down to zero, is widely known but the following examples quantify the extent to which this practice results in upward-biased risk and benefits estimates. This author recommends that EPA staff more clearly communicate subjective epistemic uncertainty in its RIA benefits estimates. More specifically, the author recommends that the Agency's central estimates of benefits in its RIA be made consistent with the science-policy judgments EPA makes in setting the criteria pollutant standards. This recommendation is in line with the need for more effective sensitivity analysis capabilities for health risk analyses, as described by Smith and Gans.⁽¹⁶⁾

4. OVERSTATEMENT OF EXPECTED BENEFITS OF THE 2012 PM_{2.5} PRIMARY NAAQS REVISION

The implications of this inconsistency are illustrated using as an example the RIA for the 2012 PM NAAQS rulemaking.⁽¹⁷⁾ In this rulemaking, the annual primary standard for PM_{2.5} was tightened from an annual average of 15 to 12 $\mu\text{g}/\text{m}^3$. In the associated RIA, a range of 460 to 1,000 fewer premature deaths per year was estimated from tightening the standard to 12 $\mu\text{g}/\text{m}^3$. This range was derived by applying two different concentration-response functions to the Agency's standard risk calculation formula. The concentration-response coefficient for the lower end of the range was derived using a coefficient from Krewski *et al.*,⁽¹⁸⁾ and the upper end of the range was derived using a coefficient from Lepeule *et al.*⁽¹⁹⁾ A yet wider range of uncertainty in potential mortality risk reductions exists, as explained in Ref. 16, but the following discussion addresses only how

the Agency's own range changes when the assumptions of the RIA's risk analysis are made consistent with EPA's reasoning when choosing how stringently to set the standard.

Calculations were performed using EPA's BenMAP model, which is a PC-based program that enables users to compute health risks associated with criteria pollutants using the standard formulas that EPA uses in its own RIAs, and using EPA's or their own input files and other assumptions.⁽²⁰⁾ The air quality input files that had been used for this RIA's calculations were obtained from EPA staff. After confirming that BenMAP does indeed replicate the mortality reduction estimates reported in the RIA using those data, the same files were then used to assess the portion of the RIA's premature mortality estimates that are associated with the linear, no-threshold assumption that assumes that the risk relationship continues to exist below the selected NAAQS. This analysis found that 70% of the benefits for the standard of 12 $\mu\text{g}/\text{m}^3$ were due to reductions in PM_{2.5} from baseline levels that were already attaining (i.e., lower than) that standard.

Given that the choice of a NAAQS level of 12 $\mu\text{g}/\text{m}^3$ meant that EPA assigned too little confidence in the continuation of health effects below 12 $\mu\text{g}/\text{m}^3$ to warrant setting the NAAQS at a lower level, standard decision analysis would assign negligible probability to calculations of benefits from reductions that would be occurring from levels below that NAAQS. That is, the *expected* values for 70% of the Agency's risk calculations should be approximately zero. When a threshold is assumed at 12 $\mu\text{g}/\text{m}^3$, BenMAP calculates that the expected risk reduction of that NAAQS would be 138 to 313 fewer premature deaths per year, considerably lower than the 460 to 1,000 deaths reported in the RIA. (Dollar values of the benefits also fall proportionally.)

As noted above, the rationale for the NAAQS arguably implies that some of the benefits derived from locations with concentrations just above 12 $\mu\text{g}/\text{m}^3$ also should be given less than 100% weight because of EPA's assurance that exposures to annual average concentrations of 12 $\mu\text{g}/\text{m}^3$ are protective *with an adequate margin of safety*. EPA rarely if ever defines the magnitude of its margin of safety quantitatively. However, ranges for its magnitude could be tested with sensitivity analyses. If, for example, the margin of safety is taken to be about 1 $\mu\text{g}/\text{m}^3$, and a threshold is assumed in the risk relationship 13 $\mu\text{g}/\text{m}^3$, BenMAP calculates the expected benefits associated with the selected NAAQS of 12 $\mu\text{g}/\text{m}^3$ are

Table I. Estimates of Avoided Premature Deaths in 2020 for the $12 \mu\text{g}/\text{m}^3$ $\text{PM}_{2.5}$ NAAQS: RIA Assumptions Compared to Alternative Views Suggested by EPA's Rationale for that NAAQS

Confidence Category (baseline $\text{PM}_{2.5}$ concentration)	NAAQS-Based Risk Reduction Estimate	RIA-Based Risk Reduction Estimate (% of total)
Already attaining ($\leq 12 \mu\text{g}/\text{m}^3$)	Approximately 0	318 (70%)
Not attaining/in margin (e.g., > 12 to $13 \mu\text{g}/\text{m}^3$)	0–117	117 (26%)
Not attaining/above margin (e.g., $> 13 \mu\text{g}/\text{m}^3$)	21	21 (5%)
Confidence weighted		
Total risk reduction estimate	21–117	456

only 21 to 48 deaths, less than 5% of the RIA's estimate of benefits from that standard.

Whether the particular assumptions in this analysis about where the concentration-response relationship begins to exist are reasonable or should be refined, its point is that the RIA's benefits estimates are very sensitive in the downward direction to expressions of declining confidence in continuation of the association at or just above the selected NAAQS level. The result is that the RIA benefits are substantially overstated compared to those that would more appropriately reflect the subjective weights expressed by EPA in its rationale for setting the standard at $12 \mu\text{g}/\text{m}^3$. Table I contrasts the results of the RIA with judgments about confidence in those risk calculations that one might infer from the NAAQS rationale, and illustrates one way that RIAs could be enhanced to better communicate to the public the implications of the judgments made in setting the NAAQS for the rule's benefits estimates.

For simplicity, Table I summarizes only the lower-bound benefits estimate of 460 deaths (which BenMAP calculates more precisely as 456 deaths).⁵ In this table, the risk estimates are divided into three "confidence categories." The lowest confidence category is for risk reductions attributed to populations already residing in areas of attainment (i.e., with annual average concentrations less than $12 \mu\text{g}/\text{m}^3$). Given the NAAQS rationale, the public health risk is *de minimis*, and in weighted terms, would be nearly zero, while in the RIA, which gives 100% weight to all such risk calculations, benefits equal to about 318 deaths per year are assigned. The middle confidence category is for risk reductions attributed to populations in areas that are just above the NAAQS before the standard is implemented, but close



Fig. 1. Areas projected in the $\text{PM}_{2.5}$ NAAQS RIA to experience health benefits under the selected NAAQS of $12 \mu\text{g}/\text{m}^3$ (456–1,033 avoided premature deaths, rounded to nearest death).

enough to attainment that they might be viewed as being within the (undefined) "margin of safety." (For purposes of constructing the illustrative tabular summary, the margin of safety is assumed to be about $1 \mu\text{g}/\text{m}^3$, meaning that less than the NAAQS-based weights would be declining or perhaps nearly zero even within this category of baseline exposures.) To reflect risk estimates that fall in this category, the NAAQS-based risk reduction estimate is listed as being somewhere between 0 and 117, while the RIA would assign it 117 with 100% confidence.

Finally, there are 21 avoided premature deaths estimated for populations living in areas well above the NAAQS. For this third category, the RIA's benefits estimates can be considered consistent with the NAAQS-based rationale. Note that for the $\text{PM}_{2.5}$ NAAQS RIA, this category accounts for only about 5% of the total RIA benefits estimate. It is recommended that RIAs provide their benefits estimates for criteria pollutants in a format such as Table I, and more explicitly provide weighted benefits estimates for confidence categories that are defined with respect to the NAAQS level.

Geographical representation of where these health benefits are expected to occur is also interesting to explore. The $\text{PM}_{2.5}$ NAAQS RIA calculated reductions in premature mortality only for areas that

⁵The upper-bound risk estimates would fall into the three rows in the table in the same proportions as seen for the lower-bound estimates in the table.

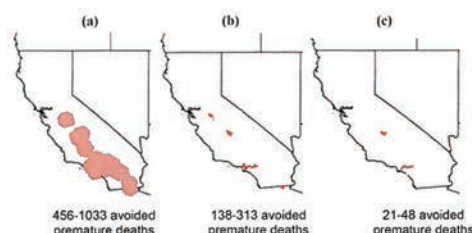


Fig. 2. Sensitivity analysis of areas projected to experience health benefits under the 12 $\mu\text{g}/\text{m}^3$ NAAQS: (a) assuming benefits for all baseline $\text{PM}_{2.5}$ levels; (b) assuming risks exist only if baseline $\text{PM}_{2.5}$ is above 12 $\mu\text{g}/\text{m}^3$; (c) assuming risks exist only if baseline $\text{PM}_{2.5}$ exceeds the selected standard by more than 1 $\mu\text{g}/\text{m}^3$.

were within 50 km of a monitor that the RIA's air quality analysis projected would not attain the new standard under baseline conditions. Fig. 1 shows the locations in which the RIA's estimate of 460–1,000 avoided premature deaths occur. It is notable that all of those benefits occur in California. Fig. 2 zooms in on California to show: (a) the areas in Fig. 1 where benefits are attributed to reductions in $\text{PM}_{2.5}$ at any level (i.e., showing the same areas as in Fig. 1); (b) the more limited areas projected to experience a health benefit when only reductions in $\text{PM}_{2.5}$ that start above the 12 $\mu\text{g}/\text{m}^3$ NAAQS are considered; and (c) the even more limited areas if a 1 $\mu\text{g}/\text{m}^3$ margin of safety is assumed to be associated with the selected standard of 12 $\mu\text{g}/\text{m}^3$. That is, Fig. 2(c) only gives weight to risks below 13 $\mu\text{g}/\text{m}^3$. Both Figs. 2(b) and (c) reveal a far smaller area of at-risk populations than assumed in the RIA (i.e., than in Fig. 2(a)).

This example from the $\text{PM}_{2.5}$ NAAQS RIA brings to light another important uncertainty in its mortality benefits. All of the benefits estimates for the NAAQS of 12 $\mu\text{g}/\text{m}^3$ are based on $\text{PM}_{2.5}$ changes in California. The risk calculations for changes in $\text{PM}_{2.5}$ in California are performed using relative risk estimates derived from the entire United States, yet the epidemiological evidence that an association between $\text{PM}_{2.5}$ and all-cause mortality risk exists in California is tenuous.⁶ Hence all of the above risk estimates might actually be zero, even if one does

not wish to discount risks in areas already below the NAAQS. In other words, the much tighter 2012 $\text{PM}_{2.5}$ NAAQS was set on the basis of projected mortality reductions that occur only in a part of the United States where the evidence of heightened mortality risk from $\text{PM}_{2.5}$ appears to be weaker than in other parts of the United States.

5. OVERSTATEMENT OF CRITERIA POLLUTANT CO-BENEFITS IN NON-NAAQS RULEMAKINGS

As explained in Ref. 15, epidemiologically-based estimates of co-benefits from coincidental reductions of ambient criteria pollutants (especially $\text{PM}_{2.5}$) have also driven statements about regulatory benefits for a majority of non-NAAQS air rulemakings in recent years. The upward bias in RIA benefits estimates becomes even more pronounced when co-benefits are calculated from coincidental criteria pollutant reductions under regulations that do not relate to the NAAQS or regulations to help attain a NAAQS. Prominent examples are the RIAs for the Mercury and Air Toxics Standards (MATS) for electricity-generating units promulgated in December 2011⁽²¹⁾ and the Clean Power Plan (CPP) proposed in June 2014.⁽²²⁾

The MATS RIA projected $\text{PM}_{2.5}$ co-benefits in the hundreds of billions of dollars per year, based almost entirely on estimates of reduced premature mortality from reductions in $\text{PM}_{2.5}$: 4,200 to 11,000 deaths per year. The reductions in $\text{PM}_{2.5}$ in the MATS RIA are projected to occur when generating units are forced to install controls to reduce acid gas emissions, which will also reduce SO_2 emissions, a precursor to ambient $\text{PM}_{2.5}$ formation. A figure in the MATS RIA reveals that over 99% of those projected benefits are projected to occur in areas where the $\text{PM}_{2.5}$ levels will already be below the $\text{PM}_{2.5}$ NAAQS

⁶The $\text{PM}_{2.5}$ RIA⁽¹⁷⁾ cites seven California-specific $\text{PM}_{2.5}$ cohort studies with all-cause risk estimates and notes that four have insignificant associations while three have larger coefficients (Ref. 17 at p. 5, A-13). However, one of the three positive findings cited (i.e., Ostro *et al.*, 2010) was erroneous, according to an erratum published the following year (Ostro *et al.*, 2011), and the corrected estimate of association was found to be insignificant. The remaining two positive findings cited were from the same cohort, one estimate being just an update of the other. Thus, the evidence for an all-cause mortality association in California alone consists of five null findings and one cohort with a positive finding.

of $12 \mu\text{g}/\text{m}^3$ (Figure 5–15 on p. 5–102 of Ref. 21). If the MATS rule's co-benefits are calculated probabilistically, accounting for the very low subjective probability that EPA assigned to the existence of the $\text{PM}_{2.5}$ -health effects relationships at levels below the NAAQS, the resulting estimate of expected benefits from the MATS rule becomes nearly zero.

The fraction of the $\text{PM}_{2.5}$ co-benefits calculated below the NAAQS is much higher in the MATS RIA than the already high level of 70% that we have found for the benefits calculated for the $\text{PM}_{2.5}$ NAAQS rule itself. This is due to the fact that benefits in the RIA for the NAAQS rule were calculated only in areas within 50 km of a monitor that was projected to be out of attainment. By letting projected nonattainment constrain the geographical area over which benefits will be calculated, one ensures that a larger fraction of the resulting benefits will indeed be from areas above the NAAQS. However, when co-benefits of some other rule are assessed using $\text{PM}_{2.5}$ risk relationships, no such constraint is applied. In the MATS rule, co-benefits were calculated across the entire nation, and furthermore, the units where acid gas controls were incremental to baseline controls were more likely to be in areas already attaining the NAAQS. As a result, nearly all of the $\text{PM}_{2.5}$ co-benefits are projected in NAAQS-attaining areas. For these reasons, the bias in $\text{PM}_{2.5}$ co-benefits estimates in RIAs for non- $\text{PM}_{2.5}$ rulemakings will tend to be much greater than the bias in the direct benefits estimates in RIAs for $\text{PM}_{2.5}$ regulations.

The same magnitude of overstatement of co-benefits is apparent in the RIA for the proposed CPP RIA, which includes co-benefits for both $\text{PM}_{2.5}$ and ozone. In the CPP RIA (focusing, for simplicity, on its Option 1 with state-level implementation) the $\text{PM}_{2.5}$ co-benefits of the rule are estimated to be up to 4,100 deaths in 2020 and up to 6,200 deaths in 2030, and the ozone co-benefits are estimated to be up to 170 and 440 in those respective years (Tables 4–16 through 4–18 on pp. 4–34 to 4–36 of Ref. 22). Unlike the MATS RIA, the CPP RIA does not provide any information on the fraction of these co-benefits that are calculated for areas already attaining those two NAAQS, but they can be inferred by replicating the co-benefits calculations from other data in the RIA.⁷ Recalling that the $\text{PM}_{2.5}$ NAAQS RIA indicates that only California will be exceeding

the $\text{PM}_{2.5}$ NAAQS in 2020, only California-based $\text{PM}_{2.5}$ co-benefits estimates could be associated with exposures in the above-the-NAAQS category: less than 1% of the CPP RIA's $\text{PM}_{2.5}$ co-benefits are attributable to changes in emissions in California in 2020. Furthermore, the $\text{PM}_{2.5}$ NAAQS is supposed to be fully attained by 2020, so even that sliver of the $\text{PM}_{2.5}$ co-benefits attributable to California are supposedly in an attainment area. Although California is not projected to attain the ozone NAAQS before 2030, less than 0.5% of the ozone-related co-benefits are associated with changes in ozone precursors in California. Thus, in the CPP RIA as well in the MATS RIA, more than 99% of the co-benefits would be discounted if health risks below the NAAQS are assigned a much lower probability (or confidence weight) than risks above the NAAQS.

6. CONCLUSION

In conclusion, we find that a large majority of the Agency's estimated health benefit from the 2012 $\text{PM}_{2.5}$ NAAQS are attributable to reductions of $\text{PM}_{2.5}$ in areas that are already in attainment of the $\text{PM}_{2.5}$ NAAQS. RIA calculations of risk reduction in areas already attaining the new NAAQS are given the same weight (i.e., subjective confidence level) as projected benefits from areas that would be exceeding the NAAQS. These RIA calculations are based on assumptions that are inconsistent with the rationale for that NAAQS. The above sensitivity analyses show that this causes RIAs' benefits estimates to be much larger than estimates of the expected benefits that can be reasonably inferred from EPA's NAAQS-setting rationale. The overstatement becomes nearly 100% for co-benefits from criteria pollutants in RIAs for non-NAAQS regulations, such as the MATS rule and the proposed CPP rule. RIAs should be written to reflect consistency with EPA's NAAQS policy judgments. Precise confidence weights will likely never be articulated, but this article has shown that the quantitative importance of such policy judgments for benefits estimates can be communicated to RIA readers in simple formats. It is the opinion of this author that such quantitative disclosure is important to maintaining credibility and trust in the Agency's RIAs.

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⁷This involves using data on emissions reductions of the $\text{PM}_{2.5}$ and ozone precursor emissions in the RIA's Table 4–10, and multiplying them by the incidence-per-ton estimates in Tables 4A–5 through 4A–7.

in preparing the analyses used in this article. The author also thanks three anonymous reviewers for their comments and suggestions. Any errors remain the author's sole responsibility.

REFERENCES

1. Section 109 (b)(1), Clean Air Act; 42 USC §7409.
2. *Whitman v. American Trucking Associations*, 531 U.S. 473–476 (2001).
3. *Lead Industries Association Inc v. Environmental Protection Agency*, 647 F.2d 1130 (1980).
4. Smith AE. Response to commentary by Fann *et al.* on “Enhancing the characterization of epistemic uncertainties in PM_{2.5} risk analyses.” *Risk Analysis*, 2015; 35(3):381–384.
5. Brauer M, Brumm J, Vedal S, Petkau AJ. Exposure misclassification and threshold concentrations in time series analyses of air pollution health effects. *Risk Analysis*, 2002; 22(5):1183–1193.
6. *American Trucking Associations v. EPA*, 175 F. 3d 1027, 1034–1037 (D.C. Cir. 1999), rehearing granted in part and denied in part, 195 F. 3d 4 (D.C. Cir. 1999), affirmed in part and reversed in part, *Whitman v. American Trucking Associations*, 531 U.S. 457 (2001).
7. *Whitman v. American Trucking Associations*, 531 U.S. 473–476 (2001).
8. 78 Fed. Reg. 3086 at 3098.
9. 78 Fed. Reg. 3086 at 3139.
10. 78 Fed. Reg. 3086 at 3161.
11. 76 Fed. Reg. 16436 at 16483.
12. *Mississippi v. EPA*, 744 F.3d 1334 (D.C. Cir. 2013).
13. Executive Order 12866. 1993. “Regulatory Planning and Review.” 58 Fed. Reg. 51735, October 4. Available at: www.whitehouse.gov/omb/inforeg/eo12866.pdf.
14. Executive Order 13563. 2011. “Improving Regulation and Regulatory Review.” 76 Fed. Reg. 3821, January 18. Available at: http://www.regulations.gov/exchange/sites/default/files/doc_files/President%27s%20Executive%20Order%2013563_0.pdf.
15. Smith, AE. An evaluation of the PM_{2.5} health benefits estimates in regulatory impact analyses for recent air regulations. Report prepared for the Utility Air Regulatory Group, December 2011, at p. 24. Available at: http://www.nera.com/content/dam/nera/publications/archive2/PUB_Smith_Ozone_NAAQS_0711.pdf.
16. Smith AE, Gans W. Enhancing the characterization of epistemic uncertainties in PM_{2.5} risk analyses. *Risk Analysis*, 2015; 35(3):361–78.
17. EPA. Regulatory impact analysis for the final revisions to the National Ambient Air Quality Standards for particulate matter, EPA-452/R-12-003, December, 2012.
18. Krewski D, Jerrett M, Burnett RT, Ma R, Hughes E, Shi Y, Turner MC, Pope CA 3rd, Thurston G, Calle EE, Thun MJ, Beckerman B, DeLuca P, Finkelstein N, Ito K, Moore DK, Newbold KB, Ramsay T, Ross Z, Shin H, Tempalski B. Extended follow-up and spatial analysis of the American Cancer Society Study linking particulate air pollution and mortality. Research Report Health Effects Institute, 2009; 140:5–114.
19. Lepeule J, Laden F, Dockery D, Schwartz J. Chronic exposure to fine particles and mortality: An extended follow-up of the Harvard Six Cities Study from 1974 to 2009. *Environmental Health Perspectives*, 2012; 120(1):81–95.
20. BenMAP version 4.0.67 Available at <http://www.epa.gov/air/benmap/download.html>.
21. EPA. Regulatory impact analysis for the final mercury and air toxics standards, EPA-452/R-11-011, December 2011.
22. EPA. Regulatory impact analysis for the proposed carbon pollution guidelines for existing power plants and emission standards for modified and reconstructed power plants, EPA-542/R-14-002, June 2014.

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**An Economic Impact Analysis of
EPA's Mercury and Air Toxics
Standards Rule**



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INTRODUCTION

On December 16, 2011, EPA released its final Mercury and Air Toxics Standards (MATS) Rule, accompanied by a Regulatory Impact Analysis (RIA) that reported the incremental cost to the U.S. electricity sector would be \$9.6 billion per year in 2015. This is a large cost to the U.S. economy and, therefore, the Rule merits close examination. NERA has the capability to analyze the electric sector impacts and associated macroeconomic impacts of emissions policies. In this paper, we analyze the economic impacts of the MATS Rule. Our analysis is designed to generally match the EPA assumptions in its own analysis, and to offer a broader range of insights about the impacts of that Rule than EPA provided in its RIA. This paper briefly summarizes the approach in our MATS analysis, compares our results to those that EPA has reported, and provides some further results that are available from our own analysis. A particular addition that this paper offers is insight into the overall economy-wide impacts of the Rule that can be expected to result from the costs that the U.S. electric sector is projected to bear under the MATS Rule – EPA did not provide such an economy-wide assessment in its RIA.

NERA's N_{ew}ERA MODEL

NERA's analysis was performed using NERA's N_{ew}ERA model.¹ The N_{ew}ERA model is an economy-wide economic model that includes a detailed representation of the electric sector. It has been designed to assess, on an integrated basis, system costs to the power sector to meet any specified policy scenario as well as the overall macroeconomic impacts of that policy scenario. For the power sector, N_{ew}ERA uses a unit-level representation of the power generation system that considers the actions each generator takes to new policies such as MATS by providing compliance options such as retrofitting, retiring, fuel switching and re-dispatching. The outputs of the model include a variety of electric sector-specific results such as number of retrofits (and types), number of retirements, number and types of new capacity additions, fuel usage, and total sector costs. In addition, because the N_{ew}ERA model includes all sectors of the economy we can also evaluate changes in fuel markets (most importantly, natural gas markets) and macroeconomic indicators such as GDP, consumption and employment measures. Additional information about the N_{ew}ERA model is included in Appendix A.

MATCHING EPA'S ANNUAL COST OF \$10 BILLION IN 2015

The initial focus of the analysis was to see how closely our own projected electric sector impacts might match the analysis that EPA performed. Note that EPA only considered the impacts of the policy on the electric sector; they did not consider the broader economic effects of the Rule on the economy that arise because of the impacts of the Rule on prices and resources throughout the economy. EPA forecast the impacts of the MATS Rule using the IPM model. EPA analyzed two policy scenarios: 1) a Baseline, which included the Cross-State Air Pollution Rule (CSAPR) that has since been stayed by the court,² and 2) MATS, which layers the requirements of the

¹ For additional technical details on the N_{ew}ERA model see http://www.nera.com/67_7607.htm.

² On December 30, 2011, the United States Court of Appeals for the D.C. Circuit issued a ruling to stay CSAPR pending judicial review.

MATS Rule on top of the Baseline; the impacts of the Rule (MATS) are calculated by comparing these two scenarios. The IPM model projected the incremental compliance costs to the electric sector in 2015 would be \$9.4 billion (in 2007\$).³ EPA added another \$0.2 billion to that cost to reflect monitoring and administrative costs, which accounts for EPA's total cost being reported as \$9.6 billion. Our analysis did not include the extra \$0.2 billion, so our cost results, when stated as the annual cost in 2015, should be compared to IPM's estimate of \$9.4 billion (2007\$). Since the N_{ew}ERA model produces results in 2010\$, it is useful to convert the IPM cost estimate of \$9.4 billion in 2007\$ to its value in 2010\$: \$9.7 billion.

NERA initially analyzed the same two policy scenarios in the N_{ew}ERA model – a Baseline with CSAPR and a scenario with the addition of MATS on top of CSAPR. We also used EPA's assumptions about retrofit options and their costs.⁴ Doing so, we projected the incremental compliance costs to the electric sector in 2015 to be \$10.4 billion (in 2010\$), which is the result that is comparable to EPA's \$9.7 billion (in 2010\$). Figure 1 compares our cost results to those from IPM with more years, and also stated as present values.⁵

Figure 1: Comparison of Annualized Incremental Compliance Costs for MATS, Relative to CSAPR

Annualized and Present Value Incremental Compliance Costs (Billions of 2010\$)				
	2015	2020	2030	PV (2014-2034)
EPA (IPM)	\$9.7	\$9.0	\$7.7	\$89.9
NERA (N _{ew} ERA)	\$10.4	\$10.8	\$11.9	\$94.8

CAPITAL COST REQUIREMENTS ARE ATTRIBUTABLE TO BOTH RETROFITS AND REPLACEMENT CAPACITY

The U.S. electric sector must not only comply with the MATS Rule, but will likely also need to comply with CSAPR, which has been stayed by the U.S. Court of Appeals. Given the investments that will need to be made to comply with CSAPR (if the stay is removed) as utilities also work towards complying with MATS, it is useful to also compare the costs to comply with the MATS Rule and with CSAPR, relative to a Baseline that includes the Clean Air Interstate Rule (CAIR), which specifies the current SO₂ and NO_x limits that generators must meet.

We addressed this issue by evaluating a scenario that did not include CSAPR in the Baseline and instead had only CAIR, which is presently the actual existing regulation. CAIR is assumed to continue into its second phase starting in 2015. Thus, we are able to make comparisons of a scenario that includes both the MATS Rule and CSAPR with one that includes CAIR, but does not include either the MATS Rule or CSAPR. The remaining results presented in this paper are based on this comparison, unless otherwise stated.

³ Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, December 2011, p. 3-13.

⁴ The only difference in assumptions about retrofit options in the N_{ew}ERA runs was to limit Dry Sorbent Injection (DSI) to units burning subbituminous coals and that have capacity less than 300 MW.

⁵ In calculating the net present value, we used a real discount rate of 5%.

There are some important details about costs that EPA did not report, but that we can report from our own analysis based on the N_{ew}ERA model. One of these is the level of total capital that electric companies will need to raise within the implementation period. EPA only reports the annual capital payments that companies incur over time to “pay back” the upfront spending. Annualized costs have relevance because they may affect electricity rates. However, the level of spending that must occur upfront is of relevance for other reasons. For example, it indicates how leveraged companies may have to become, which can affect their borrowing costs and their stock value.

The capital costs are associated with both pollution control retrofits and new capacity to replace capacity retired as a result of the Rule. Reporting only the annualized costs masks the significant increase in capital that would be required in order to comply with the MATS Rule. We thus turn to the key drivers of capital spending prior to 2015.

Retrofits

EPA’s analysis shows that in 2015 the MATS Rule (incremental to CSAPR being fully implemented first) will entail 60 GW of scrubber retrofits (wet scrubbers, dry scrubbers and dry sorbent injection combined), 63 GW of scrubber upgrades, 99 GW of activated carbon injection (ACI) and at least 102 GW of fabric filters.⁶ In contrast, our analysis shows an incremental 64 GW of scrubbers, 70 GW of ACI and 124 GW of fabric filters (the scrubber retrofit numbers are 70 GW if compared relative to CAIR). The details on the retrofits are in Figure 2.

Figure 2: Summary of 2015 Retrofit Additions

Scenario	WFGD	DFGD	DSI	Total Scrub	SCR	ACI	FF
EPA Results (IPM)							
Base (CSAPR)	55	6	9	70	0	0	0
CSAPR/MATS	52	26	52	130	0	99	102
<i>Delta</i>	<i>-3</i>	<i>19</i>	<i>44</i>	<i>60</i>	<i>0</i>	<i>99</i>	<i>102</i>
NERA Results (N_{ew}ERA)							
CAIR	18	0	0	18	15	7	4
CSAPR	18	6	0	24	15	7	9
CSAPR/MATS	19	47	22	88	16	78	128
<i>Delta from CSAPR</i>	<i>1</i>	<i>41</i>	<i>22</i>	<i>64</i>	<i>2</i>	<i>70</i>	<i>124</i>
<i>Delta from CAIR</i>	<i>1</i>	<i>47</i>	<i>22</i>	<i>70</i>	<i>2</i>	<i>70</i>	<i>124</i>

Note: Deltas may not add up due to rounding.

⁶ Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, p. 3-15.

Retirements

The other component of the capital spending relates to new capacity to replace coal-fired generators that economically retire due to the compliance requirements of the MATS Rule. EPA projects that the MATS Rule will result in an incremental 5 GW of coal-fired capacity retiring by 2015 relative to CSAPR. Our analysis of the MATS Rule has an incremental 19 GW of coal-fired capacity retiring as a result of the MATS Rule relative to CSAPR. We project 23 GW of retirements relative the Baseline without CSAPR. We note, however, that the Baseline without CSAPR has 15 GW of retirements in it, so that the total capacity retired through 2015, once both CSAPR and MATS are applied, is 38 GW. (It is about the same even if only the MATS Rule is imposed on top of the CAIR-only Baseline.) Almost all of the incremental retirements are in states east of the Mississippi River.

Some of the retired capacity is replaced by new natural gas-fired combined cycle units. This has to occur in some locations in order to maintain reserve margins.⁷ However, when reserve margins do not force replacement capacity, a significant part of the generation that comes from those retired units in the Baseline is replaced by greater generation from existing natural gas combined cycle units in the same region. Nationally, by 2015 there is an incremental build of 1 GW of natural gas combined cycle units and an incremental build of 1.5 GW of combustion turbines driven by the MATS and CSAPR Rules combined. (It is about the same even if only the MATS Rule is imposed on top of the CAIR-only Baseline.)

Total Capital Spending by 2015

Thus, there are capital costs incurred due to retrofits and replacement capacity. Between 2012 and 2015, the model projects that this capital requirement would be \$84 billion to comply with both MATS and CSAPR. This represents a 30% increase over the capital requirements in a Baseline with either CAIR or CSAPR. Such an increase might create financing challenges for individual operating companies and the sector as a whole, which could lead to credit downgrades and possibly higher costs of borrowing. We have not attempted to include these potential costs in our estimates (nor has EPA included them in theirs).

NON-CAPITAL COSTS

The capital spending is the most significant feature of the costs. In addition, there are increased costs of generation that are due to: the greater use of natural gas to displace the coal-fired plants that retire specifically as a result of the MATS Rule, operating costs of the retrofits, and the reductions in unit efficiencies resulting from the retrofits themselves.⁸ To some extent, these added operating costs are offset by reduced costs of maintaining the coal plants that are retired. The net effect of these operating costs, plus the annualized capital payments for the \$84 billion in investment, is reflected in the total costs that were reported in Figure 1.

⁷ Each region in the model has a reserve margin. If the available capacity relative to the region's peak demand falls below the required reserve level then capacity must be added to the system.

⁸ The retrofits often require additional power from the facility to operate, resulting in a net reduction in the efficiency of the plant.

OVERALL MACROECONOMIC IMPACTS ASSOCIATED WITH THE COSTS OF THE MATS RULE

The consequences of the MATS Rule are not just limited to the electric sector. The electric sector has to invest significant capital to comply with the MATS Rule. This capital and other added spending for compliance will induce lower industrial output (because the cost of power, natural gas, and other commodities will increase) and hence drive down income for workers. Although the investments also will create jobs installing the retrofits and building new power plants, the net effect of complying with the MATS Rule will be an increase in the costs of electricity and natural gas, and will produce a drag on the economy as a whole. EPA did not evaluate the MATS Rule using a macroeconomic model so they could not produce a net impact on jobs; instead they cited an estimated 46,000 short-term jobs and 8,000 long-term utility jobs created.⁹

Because the NewERA model integrates electric sector costs with the rest of the economy, our analysis also directly estimates the impacts on wages and net employment as a result of the MATS Rule. Our estimate of the net impact (inclusive of job gains associated with installing retrofits and building new power plants) of the MATS Rule in 2015 is a loss in income equivalent to 180,000 full-time jobs (215,000 full-time jobs if compared relative to CAIR). Figure 3 shows that while the largest job losses are in 2015, there are continuing job losses over time as the economy shrinks due to higher energy costs.

Figure 3: Change in Full-Time Job Equivalents

<i>Change in Full-Time Job Equivalents (Thousands)</i>	2015	2018	2021	2024
CSAPR/MATS (relative to CSAPR)	-180	5	-60	-50
CSAPR/MATS (relative to CAIR)	-215	-15	-75	-85

The costs of the MATS Rule are also reflected in several other common economic measures. For example, the present value of GDP losses from 2012 through 2035 would be between \$84 and \$112 billion dollars (\$84 billion is relative to CSAPR, \$112 billion is relative to CAIR). Figure 4 shows the annual GDP losses and the present value loss through 2035. Not surprisingly, the largest loss is in 2015 when the MATS Rule is assumed to be fully implemented.

⁹ Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, p. 6-1.

Figure 4: Change in Gross Domestic Product

<i>Change in GDP (Billions of 2010\$)</i>	2012	2015	2018	2021	2024	2027	2030	2033	Present Value
CSAPR/MATS (relative to CSAPR)	-\$1	-\$22	\$1	-\$4	-\$4	-\$4	-\$5	-\$5	-\$84
CSAPR/MATS (relative to CAIR)	-\$3	-\$25	\$1	-\$4	-\$7	-\$7	-\$7	-\$7	-\$112

Similar to GDP, the MATS Rule also leads to losses in consumption or disposable income for consumers. The present value of consumption losses from 2012 through 2035 would be between \$35 and \$71 billion dollars (\$35 billion is relative to CSAPR, \$71 billion is relative to CAIR). Figure 5 shows the annual consumption losses and the present value loss through 2035. For consumption, the largest losses are in 2012 as investment has to ramp up to meet the 2015 compliance deadline, which requires a diversion of funds from consumption to investment.

Figure 5: Change in Consumption (billions, 2010\$)

<i>Change in Consumption (Billions of 2010\$)</i>	2012	2015	2018	2021	2024	2027	2030	2033	Present Value
CSAPR/MATS (relative to CSAPR)	-10	-3	1	0	0	0	-1	-1	-35
CSAPR/MATS (relative to CAIR)	-13	-5	-1	-2	-2	-2	-3	-4	-71

CONCLUSION

Both NERA's analysis with the N_{ew}ERA model and EPA's analysis with IPM find that complying with the MATS Rule will impose annual costs on the electric sector that are approximately \$10 billion in 2015 and almost \$100 billion on a present value through 2034. Not included in these numbers are the potential for higher financing costs due to the more than \$80 billion in incremental capital that will be required in 2015.

NERA's analysis goes a step further than EPA's analysis in a few different ways. First, we also looked at the cost of complying with the MATS Rule relative to a Baseline with CAIR (instead of CSAPR). This comparison may be more relevant given that the electric sector must be working towards compliance with both the MATS Rule and CSAPR (assuming that the current stay is lifted). Second, because the N_{ew}ERA model is an integrated model of the entire economy, we are able to identify the economic impacts outside of the electric sector, which were largely ignored by EPA. These include significant net declines in labor wages, which would result in losses of full-time job equivalents; declines in the growth of the U.S. economy as measured by GDP; and declines in consumption, or household disposable income.

APPENDIX A – Additional Details on the N_{ew}ERA Model

NERA developed the N_{ew}ERA model to forecast the impact of policy, regulatory, and economic factors on the energy sectors and the economy. When evaluating policies that have significant impacts on the entire economy, one needs to use a model that captures the effects as they ripple through all sectors of the economy and the associated feedback effects. The N_{ew}ERA model combines a macroeconomic model with all sectors of the economy (except for the electric sector) with a detailed electric sector model. This combination allows for a complete understanding of the economic impacts of different policies on all sectors of the economy.

The macroeconomic model incorporates all production sectors and final demand of the economy. Policy consequences are transmitted throughout the economy as sectors respond until the economy reaches equilibrium. The production and consumption functions employed in the model enable gradual substitution of inputs in response to relative price changes, thus avoiding all-or-nothing solutions.

The main benefit of the integrated framework is that the electric sector can be modeled in great detail yet through integration the model captures the interactions and feedbacks between all sectors of the economy. Electric technologies can be well represented according to engineering specifications. The integrated modeling approach also provides consistent price responses since all sectors of the economy are modeled. In addition, under this framework we are able to model electricity demand response.

There are great uncertainties about how the U.S. natural gas market will evolve, and the N_{ew}ERA model is designed explicitly to address the key factors affecting future natural gas supply and prices. One of the major uncertainties is the availability of shale gas in the United States. To account for this uncertainty and the subsequent effect it could have on the domestic and international markets, the N_{ew}ERA model includes resource supply curves for U.S. natural gas. The model also accounts for foreign imports and U.S. exports of natural gas, by using a supply (demand) curve for U.S. imports (exports) that represents how the global LNG market price would react to changes in U.S. imports or exports.

The electric sector model is a detailed model of the electric and coal sectors. Each of the more than 17,000 electric generating units in the United States is represented in the model. The model minimizes costs while meeting all specified constraints, such as demand, peak demand, emissions limits and transmission limits. The model determines investments to undertake and unit dispatch. Because the N_{ew}ERA model is an integrated model of the entire U.S. economy, electricity demand can respond to changes in prices and supplies.

The steam coal sector is represented within the N_{ew}ERA model by a series of coal supply curves and a coal transportation matrix. The N_{ew}ERA model represents the domestic and international crude oil and refined petroleum markets.

The N_{ew}ERA model outputs include demand and supply of all goods and services, prices of all commodities, and terms of trade effects (including changes in imports and exports). The model outputs also include gross regional product, consumption, investment, disposable income, and changes in “job equivalents” based on labor wage income.



ENVIRONMENTAL LAW & POLICY CENTER

Protecting the Midwest's Environment and Natural Heritage

April 17, 2019

Submitted via Regulations.gov

U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, D.C. 20460

Attention: Docket No. EPA-HQ-OAR-2018-0794

Midwest Environmental Organizations' Comments on National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review, 84 Fed. Reg. 2670, Docket No. EPA-HQ-OAR-2018-0794

The Environmental Law & Policy Center,¹ Alliance for the Great Lakes, Friends of the Chicago River, Hoosier Environmental Council, Iowa Environmental Council, and Respiratory Health Association strongly oppose the United States Environmental Protection Agency's (EPA) proposed reversal of the finding that it is "appropriate and necessary" to regulate mercury and other hazardous air pollutant (HAP) emissions of Coal- and Oil-Fired Electric Utility Steam Generating Units (EGUs) under Section 112 of the Clean Air Act. Our organizations, which collectively have thousands of members, work throughout the Midwest and Great Lakes states to protect public health and the environment from air pollution and toxic threats like mercury.

This proposed reversal is bad policy on numerous levels, contrary to law, and imperils the positive impacts of the Mercury and Air Toxics Standards (MATS), which EPA promulgated on the basis of the appropriate and necessary finding it made in 2012 and affirmed in 2016. EPA does not provide a sufficient, reasonable explanation for why its proposed reversal completely contradicts its previous findings—nor can it, because there is no basis for such a departure.

The proposed reversal rests on a legally flawed cost-benefit analysis that ignores billions of dollars of annual health benefits that are already being realized. For the costs and benefits that it *does* consider, EPA uses outdated figures instead of the actual costs and benefits that have occurred since the MATS were implemented. The Edison Electric Institute and many power plant owners and operators are likewise asking EPA to leave the MATS in place because they have already complied with the standard, sought recovery of their compliance costs, and improved air quality. In short, there is no compelling need or reasoned justification to reverse the appropriate and necessary finding, or to rescind the MATS.

¹ The Environmental Law & Policy Center has also joined in the Joint Comments of Environmental and Public Health Organizations.

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Recalculating regulatory benefits using 2011 data and predictions, instead of real-world data that is available from several years of successful implementation, is an unprincipled and unjustified academic exercise. EPA's stated view is that it must consider only the record before the Agency in 2011 in responding to the Supreme Court's direction, but the clear intent of the proposed rule is not to protect public health or the environment or to provide an industry much-needed certainty. Instead, the proposed rule is a vehicle for EPA to finalize its preferred approach to doing cost-benefit analysis—an approach that sets the stage to change EPA rulemaking across the board, such that whenever a rule or program delivers multiple benefits, the health benefits side of the equation would be missing a crucial variable. EPA's approach of doing cost-benefit analysis with blinders on also ignores the fact that reducing multiple pollutants at the same time, with the same set of compliance activities, is efficient for the regulated community.

Mercury pollution threatens the health and economy of the Midwest. The region is home to many coal-fired plants that emit mercury and to the Great Lakes and many smaller lakes and rivers into which that mercury deposits. Through rain, snow, or dry deposition, mercury can deposit either directly into waterbodies or indirectly into waterbodies via groundwater seepage through plants and soil.² Once in water, mercury chemically transforms into methylmercury, which is readily taken up first by plant and then by animal life.³ It moves up the food chain to ultimately be consumed by people. When inhaled or ingested by humans, mercury can cause severe neurological damage, cardiovascular harm, endocrine disruption, kidney damage, and muscle coordination issues.⁴ When pregnant women are exposed, their babies can suffer IQ and motor skills impairments that will last their lifetime.⁵ State public health officials continue to issue mercury advisories warning people to limit their intake of fish from most of the Great Lakes and inland lakes and rivers in the Midwest.⁶ The Great Lakes are the largest freshwater ecosystem on earth, containing approximately one-fifth of the world's freshwater supply. *About the Lakes*, GREAT LAKES FISHERY COMMISSION, <https://www.glc.org/lakes/>. The Great Lakes support

² Woods Hole Oceanographic Institution, *Substantial Amount of Mercury Entering The Ocean Through Groundwater*, SCIENCE DAILY (March 22, 2007), <https://www.sciencedaily.com/releases/2007/03/070321181643.htm>.

³ *Id.*

⁴ *Public Health Statement for Mercury*, AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY (March 1999), <https://www.atsdr.cdc.gov/PHS/PHS.asp?id=112&tid=24#bookmark05>.

⁵ *Mercury Matters 2018: A Science Brief for Journalists and Policymakers*, HARVARD UNIVERSITY CENTER FOR THE ENVIRONMENT (Dec. 1, 2018), <http://environment.harvard.edu/news/general/mercury-matters-2018-science-brief-journalists-and-policymakers>.

⁶ See, e.g., *Find the Advice for Eating Fish from Wisconsin Waters*, WISCONSIN DEPARTMENT OF NATURAL RESOURCES, <https://dnr.wi.gov/FCSEExternalAdvQry/FishAdvisorySrch.aspx>; *Current Fish Advisory Map*, ILLINOIS DEPARTMENT OF PUBLIC HEALTH, <http://dph.illinois.gov/topics-services/environmental-health-protection/toxicology/fish-advisories/map>; *Eat Safe Fish Guide: Southwest Michigan 2018*, MICHIGAN DEPARTMENT OF HEALTH AND HUMAN SERVICES, https://www.michigan.gov/documents/mdch/MDCH_EAT_SAFE_FISH_GUIDE_-_SOUTHWEST_MI_WEB_455360_7.pdf; *Fish Consumption Advisory*, INDIANA STATE DEPARTMENT OF HEALTH, <https://www.in.gov/isdh/23650.htm>; *2018 Ohio Sport Fish Health and Consumption Advisory*, OHIO ENVIRONMENTAL PROTECTION AGENCY, <https://www.epa.ohio.gov/dsw/fishadvisory/index>; *Fish Consumption Guidelines for Women Who Are or May Become Pregnant, and Children under Age 15, Lakes*, MINNESOTA DEPARTMENT OF HEALTH, <https://www.health.state.mn.us/communities/environment/fish/docs/eating/specpoplakes.pdf>; *Fish Consumption Advisories*, IOWA DEPARTMENT OF NATURAL RESOURCES, <https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Water-Monitoring/Fish-Tissue>.

diverse populations of fish, wildlife, and plants, and provide drinking water for over 48 million people in the U.S. and Canada. *Id.* Commercial, recreational, and tribal fishing in the Great Lakes are valued at more than \$7 billion annually. *The Fishery*, GREAT LAKES FISHERY COMMISSION, <http://www.glf.org/the-fishery.php>. Mercury contamination, therefore, is of extreme concern to the businesses communities in the Great Lakes region.

We have five primary comments about the proposed reversal of the appropriate and necessary finding. We also respond specifically to EPA's numbered solicitations of comment below.

First, the agency has not provided a reasoned explanation for its change in policy. Agencies are required to provide a "reasoned explanation" when making policy changes. *Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2125 (2016). If a new policy rests upon findings which contradict those underlying the previous policy, yet the agency leaves that inconsistency unexplained, the proposed rule is arbitrary and capricious. *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515–16 (2009). EPA's conclusory explanations in the proposed rule fall short of its obligation to explain the inconsistencies between its prior appropriate and necessary finding and its current reversal of that finding.

Second, the proposed reversal rests on a legally flawed cost-benefit analysis. EPA's proposal rests on a new interpretation of the proper way to consider benefits and costs in determining whether regulation of HAP emissions from power plants is "appropriate": that only the quantifiable direct benefits of reducing emissions of air toxics should be weighed against regulatory costs. EPA asserts that this new approach, which goes against decades of Office of Management and Budget guidance and agency precedent, is the only legally correct interpretation of the Clean Air Act and the Supreme Court's direction in *Michigan v. E.P.A.*, 135 S. Ct. 2699 (2015).

EPA should not ignore multiple quantifiable benefits (often called "co-benefits"), which occur as an inevitable side effect of the technology used to reduce HAP emissions. These indirect benefits, which come along for the ride, at no extra cost, include reductions in dangerous pollutants like particulate matter and sulfur dioxide that will avoid thousands of yearly heart attacks, hospitalizations, and premature deaths.⁷ Furthermore, EPA's proposal distorts cost-benefit analysis in ways that no reasonable business would do. Savvy businesses try to achieve multiple benefits simultaneously when implementing new equipment or management practices, such as company wellness programs that improve employees' health while also holding down insurance costs.

Indeed, that's what the energy industry does when installing pollution control equipment to meet current regulatory standards. Coal plants maximize efficiency in reducing sulfur dioxide, nitrogen oxides, mercury, particulates, and other pollutants by finding a cost-effective combination of scrubbers, catalytic controls, and other approaches. Achieving simultaneous reductions in multiple pollutants is sound business practice and common sense.

⁷ *Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards*, EPA-452/R-11-011, U.S. EPA, at ES-3 (Dec. 2011), https://www3.epa.gov/ttn/ecas/docs/ria/utilities_ria_final-mats_2011-12.pdf.

Third, the cost-benefit analysis ignores readily available current data, on both the cost and benefit sides. EPA is deliberately ignoring information it could use to update the costs and the benefits of the MATS. First, since the utility sector is universally now in compliance with the rule, EPA could gather information about the actual costs utilities have experienced. The information EPA had in front of it in 2011 when the MATS were finalized was for the most part projected costs, and appears to have overestimated the cost to industry (and ultimately ratepayers), as has frequently been the case with environmental programs. Second, since the MATS record was developed in the years leading up to its release in 2011, there have been more studies relevant to the understanding of the health effects of mercury exposure. These studies, which are identified by other commenters, indicate that the quantifiable benefits of the reductions of air toxics from utilities are significantly higher than EPA estimated in 2012 and 2016. EPA should consider these studies, and incorporate the information, as appropriate, into the benefit analysis.

Fourth, the proposed reversal would create unneeded regulatory uncertainty. Although EPA asserts it is not currently proposing to rescind the MATS or to remove EGUs from the list of source categories regulated under Section 112, the proposal asks for comments on alternative interpretations of law that would allow or obligate the agency to take one or both of those regulatory actions. Reversing the appropriate and necessary finding would also open the door to a third-party administrative petition or lawsuit seeking rescission. In either case, the proposed reversal would create exactly the kind of uncertainty industry wants to avoid. Indeed, companies with facilities regulated under MATS have asked EPA to leave the MATS in place because they are already complying: EGUs have already implemented the required control technology at a lower-than-anticipated cost⁸ and have, in some cases, reduced mercury emissions to below the maximum amount allowable under the MATS.⁹ The inevitable protracted litigation resulting from a rescission attempt would leave the electricity industry, an industry for which advanced planning is particularly crucial, in a state of business and regulatory uncertainty.

Fifth, if this action does lead to rescission of the MATS, public health would be adversely affected. EPA's data show that EGUs' total HAP emissions have reduced by over 90% from 2010 to 2017, and mercury emissions have reduced by 86%. 84 Fed. Reg. 2689. Emissions of other harmful pollutants, including SO₂ and particulate, have decreased as well. If EPA were to rescind the MATS, it is likely that some facilities would choose to no longer run their control equipment, or to run it less often to reduce costs. The possibility of HAP and other pollutant emissions rebounding would pose a significant threat to public health and the environment. EPA's proposal does not discuss these implications at all.

⁸ Letter to Assistant Administrator Wehrum, (July 10, 2018), <http://src.bna.com/Ajk>; Comment Submitted by Edison Electric Institute, et al., EPA-HQ-OAR-2018-0794-0577, <https://www.regulations.gov/document?D=EPA-HQ-OAR-2018-0794-0577>.

⁹ EPA states that estimates of HAP emitted during the annual time period examined in the RTR emissions data set show emissions that "are often lower than the emission levels allowed under the requirements of the current MACT standards." 84 Fed. Reg. 2689.

Response to Solicitation of Comment C-1

Because we understand Solicitation of Comment C-1 to be asking generally for comments about one proposed and two alternative interpretations of law discussed in Solicitations of Comment C-3 to C-9, please see our responses to those solicitations below.

Response to Solicitation of Comment C-2

EPA proposes “that direct comparison of the rule’s costs and benefits is a reasonable approach, if not the only permissible approach, to considering costs in response to *Michigan*.” 84 Fed. Reg. 2276. Comparing the rule’s costs and benefits is a reasonable approach, though it is certainly not the only permissible approach. In holding that EPA had improperly ignored costs in making its renewed appropriate and necessary finding in 2012, the Supreme Court specifically stated that:

We need not and do not hold that the law unambiguously required the Agency, when making this preliminary estimate, to conduct a formal cost-benefit analysis in which each advantage and disadvantage is assigned a monetary value. It will be up to the Agency to decide (as always, within the limits of reasonable interpretation) how to account for cost.

Michigan v. E.P.A., 135 S. Ct. 2699, 2711 (2015). The way in which EPA has compared costs and benefits in the proposed rule, however, is manifestly unreasonable because it ignores significant quantifiable health benefits from non-HAP pollutant reduction, ignores significant unquantifiable benefits of HAP reduction, and uses outdated figures for both costs and benefits.

EPA asks for comments on whether its cost comparison should focus “primarily on benefits associated with reduction of HAP.” 84 Fed. Reg. 2276. However, in its proposal, EPA has not focused “primarily” on the benefits of HAP reduction, but has focused *solely* on the *quantifiable* benefits of HAP reduction, which represent only one portion of the benefits of MATS:

[W]hile there are unquantified HAP benefits and significant monetized PM co-benefits associated with MATS, the Administrator has concluded that the identification of these benefits is not sufficient, in light of the gross imbalance of monetized costs and HAP benefits, to support a finding that it is appropriate and necessary to regulate EGUs under CAA section 112.

84 Fed. Reg. 2277. EPA uses cost estimates from the 2011 Regulatory Impact Analysis (RIA) on which the “appropriate and necessary” finding was justified to support its new determination that regulation is not appropriate and necessary. The 2011 RIA projected an annual regulatory cost of \$9.4 billion in 2015, \$8.6 billion in 2020, and \$7.4 billion in 2030; annual direct benefits of \$4 to \$6 million; and annual indirect benefits of \$36 to \$89 billion. While the RIA concluded that regulation was appropriate and necessary because the total benefits greatly outweighed the costs, EPA now asserts that the regulation creates a net cost because only direct monetizable benefits of regulation should be weighed against costs. EPA bases this reversal on its new interpretation that “[t]he statutory text of CAA section 112(n)(1)(A) and the *Michigan* decision both support focusing the ‘appropriate and necessary’ determination on HAP-specific benefits and costs.” 84 Fed. Reg. 2677.

1. Consideration of Quantifiable Indirect Benefits

EPA's proposed rule criticizes the prior appropriate and necessary finding for giving indirect benefits "equal" weight as the direct benefits of HAP regulation. *See* 84 Fed. Reg. 2675–77. EPA has shown no reason that indirect benefits should be given less weight than direct benefits, and has certainly not justified giving them *zero* weight, which is precisely what EPA has done:

[I]f the HAP-related benefits are not at least moderately commensurate with the cost of HAP controls, then no amount of co-benefits can offset this imbalance for purposes of a determination that it is appropriate to regulate under CAA section 112(n)(1)(A).

84 Fed. Reg. 2276. Using EPA's 2011 numbers for the costs and benefits (which, as we discuss below, are outdated), even if monetized indirect benefits were only counted at *one-third* of their true value, they would still outweigh the costs of regulation by *billions* of dollars. The billions of dollars of projected benefits from the reduction of particulate matter represent real lives saved, health harms averted, and health care costs avoided, and EPA's justification for giving these benefits no value is groundless.

EPA asserts that, because the determination whether to regulate HAP emissions from EGUs occurs after particulate matter and other pollutants emitted by coal plants have already been regulated under other sections of the Act, Congress did not intend any indirect benefits to be considered in the "appropriate and necessary" decision. In making this argument, EPA brushes aside the multiple ways in which Congress acknowledged the importance of indirect benefits under the Clean Air Act, including the Act's requirement that EPA consider HAP reductions achieved as indirect benefits of other regulation when making the appropriate and necessary determination and a Senate Report acknowledging that control technologies implemented under Section 112(d) would have the benefit of reducing non-HAP pollutants. EPA states multiple times that nothing in the text of Section 112(n)(1)(A) allows it to consider benefits of reducing non-HAP pollutants, but Congress has established a general background principle that indirect benefits be considered when regulating under the Clean Air Act. Office of Management and Budget guidance on conducting cost-benefit analysis directs agencies to count both direct and indirect benefits.¹⁰ Unless the text of Section 112(n)(1)(A) specifies that EPA should ignore that background principle (and nothing in the text does), EPA should consider the full range of health and environmental benefits.

Michigan also supports consideration of the full range of benefits. The Supreme Court reiterated the importance of considering indirect costs of regulation when it stated that "'cost' includes more than the expense of complying with regulations; any disadvantage could be termed a cost." 135 S. Ct. at 2707. Likewise, the benefits of a regulation include more than just the direct benefits. The Court stated both that EPA has flexibility in how it evaluates costs and benefits when making the appropriate and necessary finding, *id.* at 2711, and that "an agency may not 'entirely fail[] to consider an important aspect of the problem' when deciding whether regulation

¹⁰ Circular A-4, OFFICE OF MANAGEMENT AND BUDGET (Sept. 17, 2003), <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf>.

is appropriate.” *Id.* at 2707 (quoting *Motor Vehicle Mfrs. Ass’n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983)). Benefits that include preventing thousands of hospitalizations, thousands of heart attacks, and thousands of premature deaths every year¹¹ surely count as an important aspect of the problem.

2. Consideration of Unquantifiable Direct Benefits

In addition to treating benefits of reducing non-HAP pollutants as nonexistent, the proposed rule treats unquantified direct benefits as essentially worthless. These unquantified benefits include:

[I]mpacts of Hg on human health (including neurologic, cardiovascular, genotoxic, and immunotoxic effects), a variety of adverse health effects associated with exposure to certain non-Hg HAP (including cancer, and chronic and acute health disorders that implicate multiple organ systems such as the lungs and kidneys), and effects on wildlife and ecosystems.

84 Fed. Reg. at 2677. The *only* direct benefit of HAP reduction that EPA quantified in its 2011 RIA was “IQ loss in children born to a subset of recreational fishers who consume fish during pregnancy.”¹² The proposed rule states that “after fully acknowledging the existence and importance of such benefits, the EPA proposes to conclude that substantial and important unquantified benefits of MATS are not sufficient to overcome the significant difference between the monetized benefits and costs of this rule.” 84 Fed. Reg. 2678. While there may be no clear answer as to how an agency should weigh unquantifiable benefits against monetary costs, EPA’s proposal of giving essentially no weight to these important benefits is surely inappropriate, and is a departure from its past practice of considering unquantifiable benefits when promulgating rules under the Clean Air Act.¹³

3. Use of Outdated Data from 2011

Finally, the conclusion that regulation of HAPs is not “appropriate” because of “the gross disparity” between direct costs and benefits is based on eight-year-old data that overstates the disparity. The costs of compliance have been lower than the predicted costs because prices for control technology, natural gas, and renewable energy have all proven to be lower than projected.¹⁴ Additionally, recent studies suggest that the 2011 RIA greatly underestimated the value of benefits associated with reduced mercury pollution from power plants.¹⁵ If these new

¹¹ *Regulatory Impact Analysis*, *supra* note 7, at ES-3.

¹² *Revised Technical Support Document: National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-Caught Freshwater Fish In Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units*, EPA-452/R-11-009, U.S. EPA (2011). Docket ID No. EPA-HQ-OAR-2009-0234-19913.

¹³ See, e.g., *NESHAP for Brick and Structural Clay Products Manufacturing; and NESHAP for Clay Ceramics Manufacturing*, 80 Fed. Reg. 65,470, 65,514 (Oct. 26, 2015) (discussing unquantified benefits of HAP emissions standards promulgated under Section 112 for brick, clay, and ceramic manufacturers).

¹⁴ In a March 26, 2019 letter to EPA, a coalition of energy industry associations stated that “Since the Mercury and Air Toxics Standards (MATS) became effective in 2012, it is estimated that the owners and operators of coal- and oil-based electric generating units (EGUs) have spent more than \$18 billion to comply.” See *supra* note 8.

¹⁵ *Mercury Matters 2018*, *supra* note 5 (citing several scientific studies).

studies are correct that the direct benefits amount to several billion dollars, then there is hardly a “gross disparity” between costs and benefits.

EPA’s justification for continuing to rely on 2011 projected figures instead of on the actual costs and benefits that have been experienced is that:

Given that the CAA section 112(n)(1)(A) finding is a threshold analysis that Congress intended the Agency would complete prior to regulation, the EPA believes it is reasonable for purposes of this reconsideration to rely on the estimates projected prior to the rule’s taking effect, *i.e.*, the estimates of costs and benefits calculated in the 2011 RIA.

84 Fed. Reg. at 2678. EPA is essentially saying that because it now believes it made a mistake in methodology in 2011, it should apply its new methodology to numbers it now knows, in hindsight, to be incorrect.

Response to Solicitation of Comment C-3

Also responsive to solicitation of comment C-1.

EPA correctly concludes that reversing the appropriate and necessary finding would not give the agency either the obligation or the authority to remove EGUs from the list of source categories regulated under Section 112 or to rescind the MATS emissions standards.

This is a correct legal interpretation. EPA is bound by the D.C. Circuit’s holding in *New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008) that, although Section 112 provides a unique process for adding EGUs to the list of regulated source categories, any source category added to the list may only be removed by making the findings required by Section 112(c)(9). This holding was never reviewed, let alone overturned, by the Supreme Court and thus continues to bind EPA. Because EPA is not proposing to do a delisting analysis required by Section 112(c)(9),¹⁶ EPA cannot delist EGUs.

Response to Solicitations of Comment C-4 and C-6

Because we understand Solicitations of Comment C-4 and C-6 to be asking generally for comments on the two alternative interpretations of law discussed more specifically in C-7 and C-8, please see our responses to those solicitations below.

Response to Solicitation of Comment C-5

Because we understand Solicitation of Comment C-5 to be asking the same question as C-9, see response to C-9 below.

¹⁶ The proposed rule states that any comments about whether a Section 112(c)(9) analysis should be conducted or what an analysis would demonstrate are outside the scope of this rulemaking. 84 Fed. Reg. 2679. However, EPA’s own risk analysis (which it asserts may differ meaningfully from a 112(c)(9) analysis) shows that even with the MATS in place, the estimated remaining cancer risk to the individual most exposed to emissions from the source category is 9 in 1 million. *Id.* Section 112(c)(9)(B) allows for delisting only if “no source in the category” emits HAPs in a quantity that would cause a cancer risk greater than 1 in 1 million for the most-exposed individual. It therefore seems unlikely that, were a delisting analysis completed, the statutory criteria for delisting would be met.

Response to Solicitation of Comment C-7*Also responsive to Solicitations of Comment C-1, C-4, and C-6.*

EPA asks for comments about an alternative legal interpretation under which “*New Jersey* is distinguishable” and therefore “EPA would have authority to rescind MATS and remove EGUs from the list of source categories regulation under CAA section 112 after finalizing this reversal of the 2016 supplemental finding.” 84 Fed. Reg. 2679. This alternative interpretation is that “*New Jersey* does not limit the effect of an action made in response to a Supreme Court decision finding the original action flawed, nor does it limit the Agency’s ability to revise its response to a Supreme Court decision.” *Id.*

Unless and until the Supreme Court reviews and overturns *New Jersey*’s holding, that case *does* limit EPA’s actions. The Supreme Court’s holding in *Michigan* regarding the justification behind EPA’s appropriate and necessary finding under Section 112(n)(1)(A) did not overrule or displace *New Jersey*’s holding on whether the delisting procedure in 112(c)(9) applies once an appropriate and necessary finding has been made.

As noted below, in the response to Solicitation of Comment C-8, the structure of the Clean Air Act does not allow for the MATS to be rescinded so long as EGUs remain on the list of regulated sources.

Response to Solicitation of Comment C-8*Also responsive to Solicitations of Comment C-1, C-4, and C-6.*

EPA asks for comments on an alternative legal interpretation under which “EGUs would remain on the CAA section 112(c) list of sources, but the EPA would have the authority to rescind the standards.” 84 Fed. Reg. 2679. In support of this interpretation, EPA notes that “*New Jersey v. EPA* held that the EPA may not remove a source category from the CAA section 112(c) list without demonstrating that the delisting analysis under CAA section 112(c)(9) has been satisfied, but the decision did not address the question whether, in the absence of a valid appropriate and necessary finding, the EPA must regulate EGUs for HAP.” *Id.*

The structure of the Clean Air Act does not allow for the MATS to be rescinded so long as EGUs remain on the 112 list of regulated sources. Section 112(c)(2) states that “[f]or the categories and subcategories the Administrator lists, the Administrator shall establish emissions standards under subsection (d) of this section.” Section 112(d)(1) requires that “[t]he Administrator shall promulgate regulations establishing emission standards for each category or subcategory of major sources and area sources of hazardous air pollutants listed for regulation pursuant to subsection (c) of this section.” These provisions would be violated if a source remained on this list without being subject to emissions regulations. Section 112 provides procedures for delisting sources, but not for rescinding the regulations that “the Administrator shall establish” for those sources. Therefore, the only way to properly rescind the MATS would be to follow the delisting procedure in 112(c)(9).

Response to Solicitation of Comment C-9*Also responsive to Solicitations of Comment C-1 and C-5.*

EPA asks whether, under either of the alternative interpretations of law proposed in C-7 or C-8, it would have the *obligation*, rather than the *authority* to rescind the MATS emissions standards or to remove EGUs from the list of regulated source categories. As explained above, EPA lacks the authority to delist EGUs or rescind the MATS and therefore necessarily lacks any such obligation.

Response to Solicitation of Comment C-10

Because Solicitation of Comment C-10 asks for comments on all aspects of the alternative legal interpretations of the impact of replacing the 2016 appropriate and necessary finding, please see our responses to C-7, C-8, and C-9 above.

* * *

We strongly oppose the proposal to find that it is not appropriate and necessary to regulate HAP emissions from power plants under Section 112(n) of the Clean Air Act. EPA's prior determination that regulation was appropriate rested on a cost-benefit analysis that correctly considered important health benefits, including unquantifiable benefits and those that would result from reduction of pollutants other than HAP. That finding resulted in a successfully implemented set of emissions standards that is currently benefiting the health of people, animals, and ecosystems. A reversal of the appropriate and necessary finding would only jeopardize the health gains the MATS have achieved and create uncertainty for an industry that has put this successful program in the rear-view mirror. We thank the EPA for considering our comments.

Sincerely,

Environmental Law & Policy Center

Alliance for the Great Lakes

Friends of the Chicago River

Hoosier Environmental Council

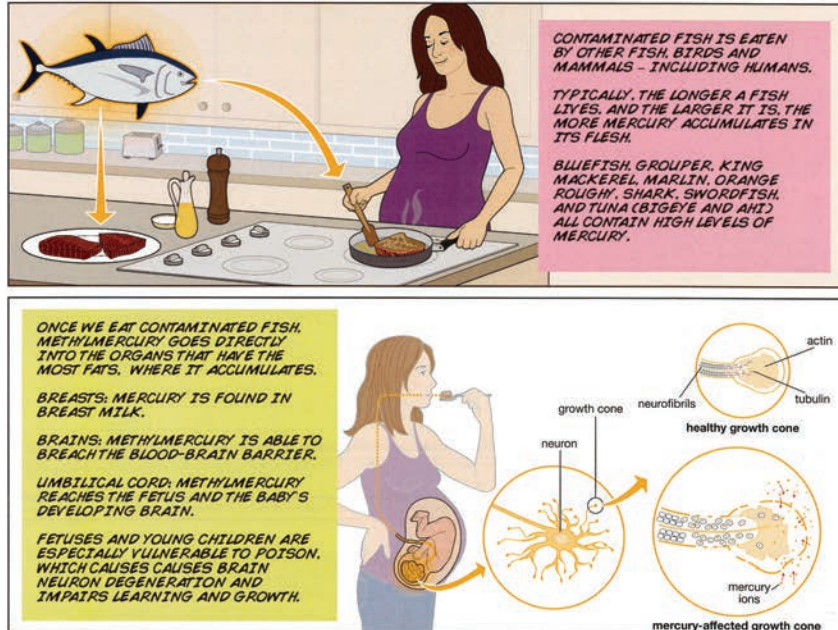
Iowa Environmental Council

Respiratory Health Association

MOMS
clean air
FORCE

FIGHTING FOR
OUR KIDS' HEALTH

HOW MERCURY POISONING WORKS



HELP US TELL POLLUTERS TO CLEAN UP THEIR COAL PLANTS

MERCURY POISONING FROM COAL PLANTS CAN BE PREVENTED BY INSTALLING SCRUBBERS TO REDUCE MERCURY EMISSIONS.

IN 2012, EPA ANNOUNCED THE FIRST NATIONAL STANDARDS REGULATING MERCURY POLLUTION FROM COAL FIRED POWER PLANTS. THESE REGULATIONS THAT PROTECT US FROM THE HARMFUL EFFECTS OF COAL FIRED POWER PLANTS ARE UNDER ATTACK.

UPDATED: SEPTEMBER 2018 SOURCES: MOMSCLEANAIRFORCE.COM/MERCURY-SOURCES

WWW.MOMSCLEANAIRFORCE.ORG

MOMS
clean air
FORCE

FIGHTING FOR
OUR KIDS' HEALTH

HOW MERCURY POISONING WORKS

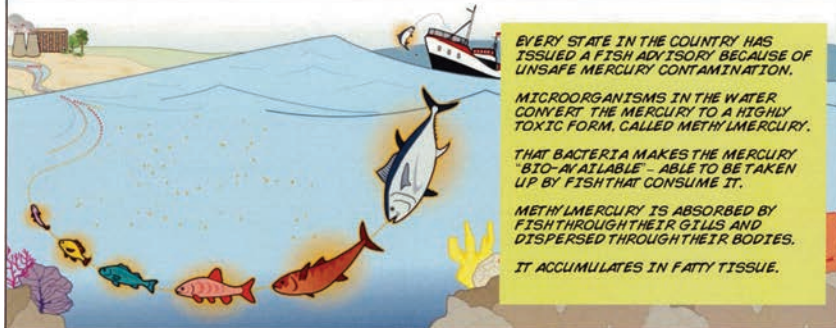
EVER WONDER WHY PREGNANT WOMEN ARE ADVISED TO CUT DOWN ON EATING TUNA?

TUNA, LIKE OTHER LARGE FISH, IS CONTAMINATED WITH MERCURY, WHICH IS A POTENT NEUROTOXIN. OVER 400,000 NEWBORNS ARE AFFECTED BY MERCURY POLLUTION EVERY YEAR. BUT HOW DID THE MERCURY GET INTO THE TUNA-AND OTHER FISH-IN THE FIRST PLACE?

COAL-FIRED POWER PLANTS ARE THE LARGEST SOURCE OF TOXIC MERCURY; THEY EMIT 42% OF ALL HUMAN-CAUSED MERCURY POLLUTION IN THE UNITED STATES.

WHEN A COAL SMOKESTACK IS NOT FILTERED, MERCURY AND OTHER POISONS-ARSENIC, LEAD, NICKEL, CHROMIUM AND ACID GASES-ARE RELEASED INTO THE AIR.

THAT MERCURY DRIFTS THROUGH THE AIR ACROSS THE GLOBE-AND RAINS DOWN INTO RESERVOIRS.



EVERY STATE IN THE COUNTRY HAS ISSUED A FISH ADVISORY BECAUSE OF UNSAFE MERCURY CONTAMINATION.

MICROORGANISMS IN THE WATER CONVERT THE MERCURY TO A HIGHLY TOXIC FORM, CALLED METHYLMERCURY.

THAT BACTERIA MAKES THE MERCURY "BIO-AVAILABLE" - ABLE TO BE TAKEN UP BY FISH THAT CONSUME IT.

METHYLMERCURY IS ABSORBED BY FISH THROUGH THEIR GILLS AND DISPERSED THROUGH THEIR BODIES.

IT ACCUMULATES IN FATTY TISSUE.

WWW.MOMSCLEANAIRFORCE.ORG

Congress of the United States
Washington, DC 20515

May 10, 2019

The Honorable Andrew Wheeler
Administrator
U. S. Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20460

Dear Administrator Wheeler,

We strongly oppose any action that could undermine or weaken the Mercury and Air Toxics Standards (MATS). We write to urge you to withdraw the Environmental Protection Agency's (EPA) December 27, 2018, proposed finding that it is not "appropriate and necessary" to regulate mercury and hazardous air pollutant (HAP) emissions from coal and oil fired power plants because of the costs of doing so. Due to the stark public health risks posed by mercury, it is imperative that MATS remain in place to protect the American people and future generations.

Mercury pollution is a potent neurotoxin that affects the nervous system, cardiovascular system, and immune function. Fetuses and young children are especially vulnerable and even low levels of exposure can have life-long impacts. MATS has been highly effective in reducing levels of mercury in the atmosphere. EPA's own proposal admits that as a result of MATS, power plants are emitting 86 percent less mercury than a decade ago and we are already seeing the public health benefits.

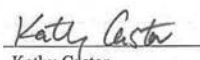
When the rule was finalized in 2012, the EPA recognized these significant public health benefits and estimated that MATS would prevent up to 11,000 premature deaths, 100,000 asthma and heart attacks, and 5,700 emergency room visits by reducing emissions of mercury and other pollutants. EPA estimated MATS would yield up to \$90 billion in benefits each year. Now, EPA proposes to ignore these significant public health benefits because they include the "co-benefits" of reducing HAP emissions in addition to mercury. Instead, EPA's proposal would consider *only* the "direct benefits" of regulating mercury pollution from power plants, which would yield up to \$6 million each year. Like other flawed environmental rules from this Administration, this MATS proposal is another example of EPA trying to suppress and artificially devalue the public health benefits of reducing air pollution in this country.

Furthermore, EPA's proposal uses the outdated *estimated* costs of complying with MATS when we already know the *actual* costs, which were an order of magnitude lower than expected. is thus arbitrarily concluding that the costs of complying with MATS outweigh its direct benefits. This proposed change makes it easier for EPA to weaken or eliminate the standards, which will undermine years of progress reducing the public's exposure to dangerous mercury and hazardous air pollution.

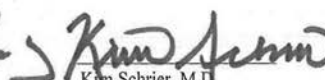
Additionally, utility companies have already spent rate-payer dollars to fully comply with MATS. Keeping the "appropriate and necessary" finding and the protective standards in place provides much-needed regulatory certainty for the electric power industry and consumers. The last compliance deadline for MATS passed more than two years ago and the utility industry has repeatedly stated that they support the rule and that no changes are necessary. EPA's proposal threatens to create regulatory uncertainty for utilities and jeopardize their investments in their pollution control equipment, which could lead to utilities turning off that equipment, thus exposing Americans to more air pollution.

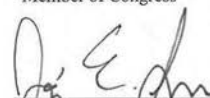
It is critical to protect our children and families from dangerous mercury pollution. Americans are breathing cleaner air and enjoy better health as a result of the safeguards in MATS. We therefore urge EPA to withdraw its proposal to revoke the "appropriate and necessary" finding and commit to adequately protecting the public from dangerous mercury and hazardous air pollution that threatens their health and welfare.

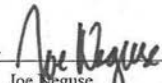
Sincerely,

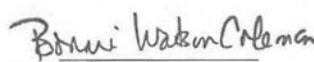

Kathy Castor
Member of Congress



Jan Schakowsky
Member of Congress

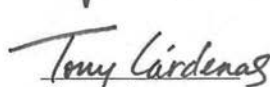

Kim Schrier, M.D.
Member of Congress



José E. Serrano
Member of Congress


Joe Neguse
Member of Congress

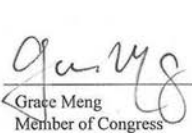

Bonnie Watson Coleman
Member of Congress

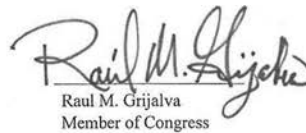

Darren Soto
Member of Congress

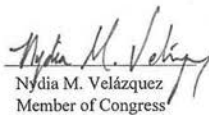

Tony Cardenas
Member of Congress

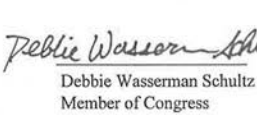

Debbie Dingell
Member of Congress

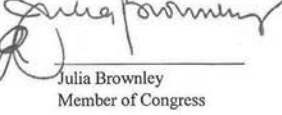

Mike Doyle
Member of Congress

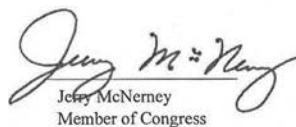

Grace Meng
Member of Congress

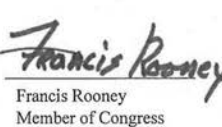

Raul M. Grijalva
Member of Congress

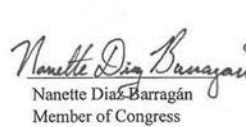

Nydia M. Velázquez
Member of Congress

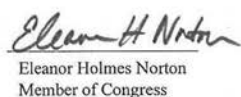

Debbie Wasserman Schultz
Member of Congress

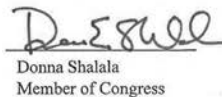

Julia Brownley
Member of Congress


Jerry McNerney
Member of Congress

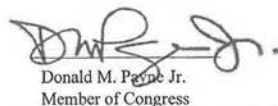

Francis Rooney
Member of Congress

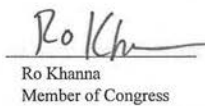

Nanette Diaz Barragán
Member of Congress


Eleanor Holmes Norton
Member of Congress

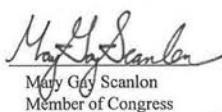

Donna Shalala
Member of Congress

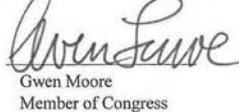

Jared Huffman
Member of Congress


Donald M. Payne Jr.
Member of Congress

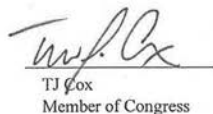

Ro Khanna
Member of Congress


Diana DeGette
Member of Congress

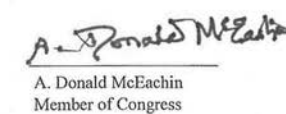

Mary Gay Scanlon
Member of Congress


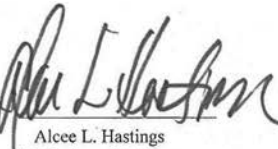


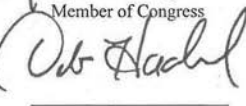
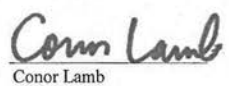
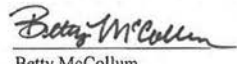

Gwen Moore
Member of Congress


Jeff Van Drew
Member of Congress


TJ Cox
Member of Congress


Bill Foster
Member of Congress


A. Donald McEachin
Member of Congress

 Suzanne Bonamici Member of Congress	 Alcee L. Hastings Member of Congress	 Steve Cohen Member of Congress
 Mike Levin Member of Congress	 Deb Haaland Member of Congress	 Conor Lamb Member of Congress
 Betty McCollum Member of Congress		



March 26, 2019

The Honorable William L. Wehrum
 Assistant Administrator
 Office of Air and Radiation
 U.S. Environmental Protection Agency
 1200 Pennsylvania Ave, NW
 Washington, DC 20460

Dear Assistant Administrator Wehrum:

The Environmental Protection Agency (EPA or Agency) has proposed a Reconsideration of Supplemental Finding for National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-fired Electric Utility Steam Generating Units. EPA has also proposed a Residual Risk and Technology Review (RTR) concurrently with its reconsideration. 84 *Fed. Reg.* 2,670 (Feb. 7, 2019). EPA's 2016 Supplemental Finding followed the Supreme Court's decision in *Michigan v. EPA*, which held that EPA must consider costs in evaluating whether it is appropriate and necessary to regulate EGUs.

Driven by several factors—including customer demands, technology developments, and federal and state regulatory obligations—the electric power industry is undergoing a transition of its electric generating fleet that will continue over the next decade and beyond. Concurrent with this transition, electric companies, public power utilities, and electric cooperatives are making significant investments to make the energy grid smarter, cleaner, more dynamic, more flexible, and more secure in order to integrate and deliver a balanced mix of central and distributed energy resources.

As many of our organizations and members noted to you last year, we again ask that EPA complete the statutorily mandated RTR¹ for power plants as expeditiously as possible. Since the Mercury and Air Toxics Standards (MATS) became effective in 2012, it is estimated that the owners and operators of coal- and oil-based electric generating units (EGUs) have spent more than \$18 billion to comply and they have significantly reduced mercury and other emissions, as well as retired assets and invested in new, replacement generation. Given this investment and industry's full implementation of MATS, regulatory and business certainty regarding regulation under Clean Air Act (CAA) section 112 is critical—we urge that EPA leave the underlying MATS rule in place and effective. Many of these same units complying with MATS today are subject to ongoing rate reviews regarding recovery of costs by investor-owned electric companies. In the case of public power utilities and rural electric cooperatives (even those that are rate regulated by state commissions), compliance costs are directly borne by their customers.

EPA should take no action that would jeopardize these investments or the underlying rule. Should EPA take any action that could result in the rescission of the underlying MATS rule, despite the above request, EPA should consider the impacts such an action would have on these costs already borne by industry and how the recovery of these sunk costs could be put in jeopardy, consistent with the Supreme Court's directive in *Michigan v. EPA* to "consider cost." 135 S. Ct. at 2670 (2015).

Given that industry has already fully implemented MATS, EPA should sustain the MATS rule, complete the RTR, and separately pursue a regulatory process regarding the considerations of costs and benefits analysis under the CAA. EPA's advance notice of proposed rulemaking on *Increasing Consistency and Transparency in Considering Costs and Benefits in the Rulemaking Process*, 83 Fed. Reg. 27,524 (June 13, 2018) can serve as a starting point for this effort. EPA could also apply these principles in a prospective manner in separate rulemakings. Such a rule could establish general principles on cost considerations that recognize that there are statute-specific requirements that may require different consideration of costs, at least with respect to standard setting. Further, it would be appropriate for the rule to be implemented prospectively both to ensure the consistent application of costs and benefits moving forward and to avoid potential disruption to previously implemented regulatory programs where real and significant sunk costs have already been incurred.

We urge EPA to focus on and finalize an RTR for power plants under CAA section 112. A complete and robust RTR would recognize the capital investments already made for compliance and would allow the industry to continue full implementation of the MATS rule. We also urge EPA to consider separately proposing potential technical revisions to MATS unrelated to the standards themselves that could lower compliance costs—such as considering whether performance tests could be performed less frequently if units are running less frequently—while still ensuring that the standards are being achieved. This approach would ensure the standards are being achieved and provide the regulatory and business certainty our members need as they continue to provide safe, reliable, affordable, and increasingly clean energy to their customers.

¹ See CAA sections 112(d)(6) and (f)(2), which require that EPA complete the RTR within eight years, or in this case by April 16, 2020.

Sincerely,

The Edison Electric Institute
 The American Public Power Association
 The National Rural Electric Cooperative Association
 The Clean Energy Group
 The Class of '85 Regulatory Response Group
 The Global Energy Institute at the U.S. Chamber of Commerce
 The Large Public Power Council
 The International Brotherhood of Electrical Workers
 The International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers & Helpers
 The Laborers International Union of North America

The Edison Electric Institute (EEI) is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for about 220 million Americans, and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than 7 million jobs in communities across the United States. In addition to our U.S. members, EEI has more than 60 international electric companies, with operations in more than 90 countries, as International Members, and hundreds of industry suppliers and related organizations as Associate Members.

The American Public Power Association (APPA) is the national service organization representing the interests of over 2,000 community-owned, not-for-profit electric utilities. These utilities include state public power agencies, municipal electric utilities, and special utility districts that provide low-cost, reliable electricity and other services to over 49 million Americans.

The National Rural Electric Cooperative Association (NRECA) is the national service organization for more than 900 not-for-profit electric utilities that provide electricity service to approximately 42 million consumers. NRECA members own and maintain 2.6 million miles, or 42 percent, of the nation's electric distribution lines and account for 11 percent of the total kilowatt-hours in the U.S. each year. With a commitment to contribute to the vitality and prosperity of the communities served by our members, electric cooperatives are dedicated to a healthy environment, building vibrant rural communities, and providing reliable and affordable electricity to our cooperative consumer.

The Clean Energy Group (CEG) is a coalition of electric generating and electric distribution companies that share a commitment to responsible environmental stewardship. The mission of CEG is to support and enhance the efforts of its members in understanding state and federal legislative, regulatory, and policy developments in environmental and energy areas.

The Class of '85 Regulatory Response Group is a voluntary ad hoc coalition of approximately 30 electric generating companies from around the country that has been actively involved in the development of Clean Air Act rules affecting the electric generating industry for over 28 years. The Class of '85 has written comments on all major stationary source regulations since the early 1990s, and members of the Class of '85 own and operate EGUs in approximately 35 states throughout the United States.

The Global Energy Institute, an affiliate of the U.S. Chamber of Commerce, acts to unify policymakers, regulators, business leaders, and the American public behind a common sense energy strategy to help keep America secure, prosperous, and clean. Through policy development, education, and advocacy, the Institute is building support for meaningful energy action at the local, state, national, and international levels.

The Large Public Power Council (LPPC) is comprised of 27 of the nation's largest public power systems that serve 30 million Americans, about 10 percent of the U.S. population. LPPC members are locally governed and directly accountable to consumers. We are not-for-profit and committed to reliability, affordability and environmental stewardship for the consumers and communities we serve. LPPC advocates for policies that allow public power systems to build infrastructure, invest in communities and provide reliable service at affordable rates.

The International Brotherhood of Electrical Workers (IBEW) represents approximately 775,000 members and retirees who work in a wide variety of fields, including construction, utilities, manufacturing, telecommunications, broadcasting, railroads and government.

Established in 1880, the International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers & Helpers is a diverse union representing workers throughout the United States and Canada who are employed in industrial construction, maintenance and repair; ship building; manufacturing; railroads; cement; mining and related industries.

The Laborers' International Union of North America (LIUNA) is a powerhouse of workers who are proud to build the United States and Canada. LIUNA members are a skilled and experienced union workforce trained to work safely in the construction and energy industries. Members build infrastructure - from roads, bridges, and transit to schools and skyscrapers. They are certified to install rainwater catchment systems and trained to build water and sewer systems. Members also work in every area of the energy sector, helping to build solar plants, wind farms, and natural gas and oil pipelines, as well as, being skilled in the maintenance of nuclear and coal power plant facilities.

DARREN SOTO
9TH DISTRICT, FLORIDA

1429 LONGWORTH HOUSE OFFICE BUILDING
(202) 225-9889

Congress of the United States
House of Representatives
Washington, DC 20515-0909

September 5, 2017

The Honorable Scott Pruitt
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Re- Coal Ash Dumping in the Peñuelas Valley Landfill

Dear Administrator Pruitt,

It has come to my attention, after speaking with several of my constituents, the dire risks to the environment and human health caused by the management of Coal Combustion Residuals (CCR) in Puerto Rico. In particular, the dumping of coal ash in the Peñuelas Valley Landfill, as a result of the electrical energy production generated by AES' coal-burning power plant in Guayama, Puerto Rico. AES is an energy company which generates and distributes electrical power.

Coal ash is a byproduct produced when coal is burned to fuel electrical power plants, such as the one operated by AES. One of the main CCRs being deposited is called "Agremax," which is a partially solidified mixture of coal combustion fly ash and bottom ash. In 2012, the EPA released a study titled "Leaching Behavior of AGREMAX Collected from a Coal-Fired Power Plant in Puerto Rico," which found that CCR contains several toxic chemicals, such as arsenic, boron, chloride, chromium, and selenium. These toxic chemicals have been found to cause serious effects on human health such as asthma, birth defects, and cancer. Therefore, leaching from a disposal site similar to the one in Peñuelas, Puerto Rico, poses a serious risk to human health and safety.

Several of my constituents either derive from Peñuelas, Puerto Rico, or have family members being impacted by the dumping of coal ash. With the serious health and environmental concerns over the dumping of coal ash, I urge the EPA to review the safety and adequacy of dumping coal ash in the Peñuelas Valley Landfill, including a thorough review of whether the practice and the site are performing in accordance with federal standards. Thus ensuring any existing or future risks to human health and the environment are addressed properly. As a Member of the House Natural Resources Indian, Insular and Alaskan Native Affairs Subcommittee, which oversees issues relating to Puerto Rico, I hereby request a written response detailing all risks posed by the Peñuelas Valley Landfill and actions being taken by the EPA to address the issue.

Thank you in advance for your attention to this matter. My office will be in contact with you to follow up on this request. If you have any questions or comments, do not hesitate to reach out to our office.

Sincerely,



Darren Soto
Member of Congress



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 30 2018

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

NOW THE
OFFICE OF LAND AND
EMERGENCY MANAGEMENT

The Honorable Darren Soto
U.S. House of Representatives
Washington, D.C. 20515

Dear Congressman Soto:

Thank you for your letter of September 5, 2017, to the U.S. Environmental Protection Agency, regarding Coal Combustion Residuals (CCR), the management of "Agremax" in Peñuelas, Puerto Rico and recommending that the EPA review the safety and adequacy of the Peñuelas Valley Landfill, detailing all risks posed, as well as actions taken by the EPA to address these issues. The agency appreciates your concerns about these issues.

The EPA has been working with the Puerto Rico Government to ensure the proper disposal of solid wastes, including CCR, throughout the island. Although solid waste is primarily a matter of state, or in this case, territorial responsibility, the EPA has actively used its civil and administrative authorities to address solid waste and CCR issues in Puerto Rico. Since 2007, the EPA has taken legal actions to close 12 operating solid waste landfills and require a thirteenth landfill to stop accepting waste. The EPA is continuing to assess landfills and develop legal agreements where appropriate.

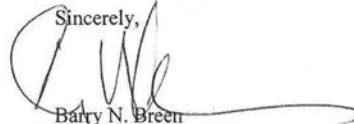
In 2015, the EPA issued an Administrative Order on Consent (AOC) under the Clean Water Act (CWA) to address CCR management at the Applied Energy Services Puerto Rico, L.P. (AES) coal-fired power plant in Guayama, Puerto Rico. AES complied and the AOC was terminated in February 2017. In August 2017, the EPA issued AES a Notice of Violation (NOV) under the CWA for non-compliance with the dust control measures and maintenance of storm water runoff control measures as required by the 2015 Multi-Sector General Permit for Stormwater Discharges from Industrial Activity. In response, AES submitted information about the actions taken to address the NOV. Two actions, required by the NOV, are still pending due to the passage of Hurricanes Irma and Maria.

Furthermore, on April 17, 2015, EPA finalized national regulations to regulate the disposal of CCR as solid waste under subtitle D of the Resource Conservation and Recovery Act (RCRA) titled, *Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities*, (80 FR 21302) ("CCR rule"). The CCR rule established national minimum criteria for existing and new CCR landfills, existing and new CCR surface impoundments, and all lateral expansions. In the CCR rule, the EPA also determined that disposal of CCR in a lined Municipal Solid Waste landfill was a safe and proper disposal practice. It is our understanding that the Peñuelas Valley Landfill is a modern landfill that has a liner and leachate collection. Finally, in May 2016, the EPA conducted a RCRA inspection at the Peñuelas Valley Landfill that confirmed operational controls were in place for

Agremax/ash disposal. The EPA is continuing to work to evaluate and address CCR and solid waste management in Puerto Rico.

Again, thank you for your letter. If you have further questions, please contact me or your staff may contact Carolyn Levine in the EPA's Office of Congressional and Intergovernmental Relations at levine.carolyn@epa.gov or at (202) 564-1859.

Sincerely,

A handwritten signature in black ink, appearing to read 'B. Breen', with a long horizontal flourish extending to the right.

Barry N. Breen
Principal Deputy Assistant Administrator

**Committee on Energy and Commerce
Subcommittee on Oversight and Investigations**

**Hearing on
“Undermining Mercury Protections: EPA Endangers Human Health and the
Environment”**

May 21, 2019

**Ms. Janet McCabe, Professor of Practice, Environmental Law, McKinney School of Law,
Indiana University-Purdue University Indianapolis**

The Honorable Frank Pallone, Jr. (D-NJ)

1. The 2011 Regulatory Impact Analysis estimated \$37-90 billion annually in health benefits from the MATS rule, a great majority of which would come from estimated reductions in particulate matter emissions. Specifically, the estimates included health benefits of reducing particulate matter at levels below the standard of 12 micrograms/cubic meter set by the National Ambient Air Quality Standards (NAAQS). It has been suggested that health benefits that accrue from reductions below the NAAQS standard for particulate matter should not be counted because the standard is already set to be sufficiently protective of human health.

Is it appropriate to include in health benefit estimates those benefits that accrue from reducing particulate matter emissions below the current NAAQS level? Why or why not?

Response to Question 1 (Rep. Pallone)

It is appropriate, and consistent with longtime practice of the EPA, to include in health benefit estimates the health benefits that accrue from reducing particulate matter emissions below the current NAAQS level. In fact, it would be contrary to science and inconsistent with EPA’s mission to protect human health to not include such benefits.

EPA has articulated in many National Ambient Air Quality Standards (NAAQS) rulemakings that the level ultimately established by the EPA Administrator as the national public health standard does not represent the level at which there is no public health risk. See the discussion in the final 2015 Ozone Rule at [80 FR 65295](#), October 26, 2015. No threshold has been established by the scientific or medical communities below which there are no health impacts from exposure to PM, and the federal courts have itself affirmed numerous times that the NAAQS are not required by law to represent a zero-risk standard. It inevitably follows, therefore, that there are health impacts below the level of the standard—some people, in some locations, suffer some amount of health impact at levels below the standard. Air modeling and public health analytical methodologies can be used to estimate, with appropriate cautions about uncertainty, the harm associated with those expected exposure. [OMB Circular A-4](#), which provides OMB’s guidance to federal

Ms. Janet McCabe
August 6, 2019
Page 3

agencies for their implementation of Executive Order 12866 regarding cost-benefit analysis of significant federal actions, is clear that agencies should consider the full range of benefits that can be identified for a proposed regulatory action. EPA's analytical approach is fully explained in the final [Regulatory Impact Analysis for the 2012 Fine Particle Final Rule](#).

The Honorable Diana DeGette (D-CO)

1. Section 112 of the Clean Air Act regulates air toxic emissions such as mercury. Sections 108, 109 and 110 of the Act regulate criteria pollutants such as particulate matter ("PM"). At the hearing, Mr. Gustafson suggested that EPA's reliance on PM co-benefits in the 2016 Supplemental Finding violates an express prohibition in Section 112 against regulating criteria pollutants.

Does Section 112 of the Clean Air Act either expressly or implicitly prohibit EPA from considering co-benefits in deciding whether regulation of mercury and other air toxics from power plants is "appropriate and necessary"?

Response to Question 1 (Rep. DeGette)

The argument that the full range of public health benefits resulting from a rule promulgated under Section 112, including those from reductions in pollutants other than those directly regulated by the rule, cannot be considered is illogical and without basis in the law or common sense.

Section 112 does not explicitly prohibit consideration of health benefits from criteria pollutants. EPA follows OMB [Circular A-4](#) in assessing the costs and benefits of rules promulgated under Section 112, as it does for all significant actions. Circular A-4 is clear that the full range of benefits should be considered.

An indication that Congress intended EPA to consider the full range of benefits is found in Section 112(k)(2), which calls for a research program between EPA and the states regarding area (i.e. small) sources of air toxics. It states that the research program should include:

consideration of atmospheric transformation and other factors which can elevate public health risks from such pollutants.

Health effects considered under this [program](#) shall include, but not be limited to, carcinogenicity, mutagenicity, teratogenicity, neurotoxicity, reproductive dysfunction and other acute and chronic effects including the role of such pollutants as precursors of ozone or acid aerosol [formation](#). Section 112(k)(2)(C).

Reference to ozone and acid aerosol formation, and the use of the phrase "shall include, but not be limited to," both indicate that Congress was aware that reductions in toxic air pollutants could have ancillary benefits via reductions in other types of pollution that have their own effects on public health.

**Committee on Energy and Commerce
Subcommittee on Oversight and Investigations**

**Hearing on
“Undermining Mercury Protections: EPA Endangers Human Health and the
Environment”**

May 21, 2019

**Mr. Michael A. Livermore, Associate Professor of Law, University of Virginia School of
Law**

The Honorable Frank Pallone, Jr. (D-NJ)

1. At the hearing, Representative Griffith asked Mr. Gustafson whether the EPA had considered ancillary costs, or co-costs, in evaluating the costs and benefits of regulating mercury and other air toxics in the 2016 Supplemental Finding entitled, “Supplemental Finding That It Is Appropriate and Necessary to Regulate Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units.” Mr. Gustafson replied that the EPA did not. However, in a response to a question from Mr. Sarbanes later in the hearing, you disagreed and stated that the EPA did consider co-costs as part of the Mercury and Air Toxics Standards and as part of this current proposal to rescind the “appropriate and necessary” finding.
 - a. Can you explain how the EPA considered co-costs in support of its 2016 Supplemental Finding?

Response 1a

The 2016 Supplemental Finding relied on a compliance cost estimate from the 2012 Regulatory Impact Assessment (RIA) for the final MATS rule.¹ The cost estimates for that rule were for the power sector as a whole, not only MATS-related expenditures made by plants subject to the rule’s emissions limits.² EPA’s peer-reviewed Guidelines for Preparing Economic Analyses (“EPA’s Economic Guidelines”) define direct costs as “those costs that fall directly on regulated entities as the result of the imposition of a regulation.”³ Indirect costs, meanwhile, are “those incurred in related markets or experienced by consumers or government agencies not under the

¹ EPA, Supplemental Finding That It Is Appropriate and Necessary to Regulate Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units, 81 Fed. Reg. 24,420, 24,423 (Apr. 25, 2016) [hereinafter EPA, Supplemental Finding].

² “The annual incremental cost is the projected additional cost of complying with the final rule in the year analyzed, and includes the amortized cost of capital investment (at 6.15%) and the ongoing costs of operating additional pollution controls, investments in new generating sources, shifts between or amongst various fuels, and other actions associated with compliance.” EPA, Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards 3-13 (Dec. 2011) (emphasis added).

³ EPA, Guidelines for Preparing Economic Analyses 8-7 (2010).

Mr. Michael A. Livermore

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direct scope of the regulation.”⁴ In the case of the MATS rule, indirect costs (or “co-costs”) would include expenditures incurred at natural gas-fired combined cycle units that ramp up generation to compensate for MATS-driven coal plant retirements.

In the 2016 Supplemental Finding, EPA expressly acknowledged that its compliance cost estimate included indirect costs.⁵

- b. Can you explain how the EPA considers co-costs as part of its recent proposal to rescind the “appropriate and necessary” finding?

Response 1b

EPA continues to rely on the cost estimates from the 2012 RIA in its proposal to rescind the “appropriate and necessary” finding.⁶ As discussed above, this estimate includes indirect costs.

- c. How does the EPA’s treatment of co-costs in its current proposal compare to its treatment of co-benefits in the proposal?

Response 1c

In its proposal, the agency states:

In this action, the EPA proposes to conclude that it is not appropriate and necessary to regulate HAP from EGUs under CAA section 112 because the costs of such regulation grossly outweigh the HAP benefits.⁷

In other words, EPA gives full weight to co-costs while functionally ignoring co-benefits.

⁴ *Id.*

⁵ “In conducting benefit-cost analyses, the EPA routinely considers consequences (both positive and negative) that are ancillary to the intended purpose of a regulation. For example, the \$9.6 billion cost estimated in the MATS RIA included costs that would be passed on to electricity customers and higher fuel costs, which are beyond the costs borne by owners of coal- and oil-fired units regulated by MATS.” EPA, Supplemental Finding at 24,439–40.

⁶ EPA, National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review 2677 (Feb. 2019) (stating that “the total cost of compliance with MATS (\$7.6 to \$9.6 billion annually) dwarfs the monetized HAP benefits of the rule”).

⁷ *Id.* at 2676

Mr. Michael A. Livermore
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- d. In your opinion, is it appropriate for the EPA to consider co-costs but not co-benefits?

Response 1d

It is irrational and inconsistent with prior practice, relevant guidance documents, and the goals of cost-benefit analysis to disregard co-benefits. It is especially arbitrary to treat co-benefits and co-costs differently, as occurred in this rule.

- e. What is the impact of considering co-costs but not co-benefits?

When an agency relies on a cost-benefit analysis to support its rulemaking, as EPA has done here, “a serious flaw undermining that analysis can render the rule unreasonable.”⁸ For all the reasons discussed above, failing to consider indirect benefits is serious flaw in EPA’s proposed rescission of the appropriate-and-necessary finding, rendering the decision unreasonable and arbitrary.

2. Section 112 of the Clean Air Act regulates air toxic emissions such as mercury. Sections 108, 109 and 110 of the Act regulate criteria pollutants such as particulate matter (“PM”). At the hearing, Mr. Gustafson suggested that the EPA’s reliance on PM co-benefits in the 2016 Supplemental Finding violates an express prohibition in Section 112 against regulating criteria pollutants.
 - a. Does Section 112 of the Clean Air Act either expressly or implicitly prohibit the EPA from considering co-benefits in deciding whether regulation of mercury and other air toxics from power plants is “appropriate and necessary”?

Response 2a

There is no express text in Section 112 that addresses the issue of co-benefits. In the absence of an express prohibition, case law suggests that EPA has discretion to take such benefits into account. For example, in *U.S. Sugar Corp. v. EPA*, the D.C. Circuit held that EPA properly exercised discretion to consider potential non-HAP co-benefits when setting standards for

⁸ Nat’l Ass’n of Home Builders v. EPA, 682 F.3d 1032, 1040 (D.C. Cir. 2012).

Mr. Michael A. Livermore

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hydrogen chloride emissions from boilers under section 112(d)(4).⁹ The court noted that the “text [of section 112(d)(4)] does not foreclose the Agency from considering co-benefits” and that considering such benefits “is consistent with the [Clean Air Act]’s purpose—to reduce the health and environmental impacts of hazardous air pollutants.”¹⁰

- b. Does the Supreme Court’s decision in *Michigan v. EPA* expressly or implicitly prohibit the EPA from considering co-benefits in deciding whether regulation of mercury and other air toxics from power plants is “appropriate and necessary”?

Response 2b

In *Michigan v. EPA*, the Supreme Court interpreted the term “appropriate” as “the classic broad and all-encompassing term that naturally and traditionally includes consideration of all the relevant factors.”¹¹ The thrust of *Michigan v. EPA* is to reject a narrow interpretation of the types of factors that the agency may consider as part of its analysis under section 112. Because the issue was not presented, the Court expressly declined to address the issue of co-benefits and whether and how they should be weighed against costs.¹²

The Honorable Diana DeGette (D-CO)

1. In its current proposal, the EPA claims that the 2016 Supplemental Finding erred in using a “cost reasonableness” approach based on compliance costs relative to the size of industry. The EPA asserts that such an approach does not satisfy the EPA’s obligations under section 112(n)(1)(A) of the Clean Air Act, as informed by *Michigan v. EPA*, 135 S. Ct. 2699 (2015). 84 Fed. Reg. 2670, 2674-2675 (Feb. 7, 2019).

In your opinion, does the “cost reasonableness” approach that EPA took in its 2016 Finding meet the requirements of the Clean Air Act and appropriately respond to the Supreme Court’s direction in *Michigan v. EPA*? Why or why not?

⁹ 830 F.3d 579, 625–26 (D.C. Cir. 2016).

¹⁰ *Id.*

¹¹ 135 S. Ct. 2699, 2707 (2016) (quoting *White Stallion Energy Ctr., LLC*, 748 F.3d at 1266 (Kavanaugh, J., dissenting)).

¹² 135 S. Ct. at 2711

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Response 1

The *Michigan* Court emphasized EPA's discretion concerning how to conduct its economic analysis, noting that it would be "up to [EPA] to decide (as always, within the limits of reasonable interpretation) how to account for cost."¹³ Courts have upheld many past EPA Clean Air Act rules that address the question of cost consideration in a similar fashion to the "cost reasonableness" approach in the 2016 Finding.¹⁴

¹³ *Id.* at 2711.

¹⁴ See EPA, Legal Memorandum Accompanying the Proposed Supplemental Finding that it is Appropriate and Necessary to Regulate Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units (EGUs) 18–19 (2015).

Committee on Energy and Commerce
Subcommittee on Oversight and Investigations

Hearing on
“Undermining Mercury Protections: EPA Endangers Human Health and the Environment”

May 21, 2019

Dr. Noelle Eckley Selin, Associate Professor, Earth, Atmospheric, and Planetary Sciences, MIT Institute for Data, Systems, & Society, Massachusetts Institute of Technology

The Honorable Frank Pallone, Jr. (D-NJ)

1. The 2011 Regulatory Impact Analysis estimated \$37-90 billion annually in health benefits from the MATS rule, a great majority of which would come from estimated reductions in particulate matter emissions. Specifically, the estimates quantified health benefits of reducing particulate matter at levels both above and below the standard of 12 micrograms/cubic meter set by the National Ambient Air Quality Standards (NAAQS). In his testimony, Mr. Gustafson suggested that health benefits that accrue from reductions below the NAAQS standard for particulate matter should be discounted because that standard is already set to be sufficiently protective of human health.

Are there studies that demonstrate whether there are health benefits to reducing particulate matter emissions below the current NAAQS standard? What do these studies conclude about such benefits?

Previous studies have demonstrated that mortalities from PM_{2.5} exposure occur at levels below the NAAQS. The EPA’s Integrated Science Assessment for Particulate Matter (2009) assessed scientific studies on the associations between PM_{2.5} and health impacts, and found that there is little evidence to support a threshold below which PM_{2.5} exposure is not harmful. This conclusion was based on a review of numerous available epidemiological studies, largely focused on the association between exposure and mortalities. More recent studies have provided even more evidence that low-level exposure is harmful. For example, a recent study focusing on air pollution and mortality among Medicare recipients showed significant evidence of adverse effects at levels below national standards (e.g. Di et al., 2017).

Citations:

Q. Di et al., Air Pollution and Mortality in the Medicare Population, New England Journal of Medicine 376:2513-22 (2017)

U.S. EPA. Integrated Science Assessment (ISA) For Particulate Matter (Final Report, Dec 2009). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/139F, 2009.

Dr. Noelle Eckley Selin

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2. The U.N. Minamata Convention on Mercury, which the United States signed in 2013 following the issuance of the MATS rule, is a multilateral agreement that addresses specific human activities which are contributing to widespread mercury pollution. You have studied the potential benefits to the United States of reductions in mercury that would result from the Minamata Convention in your paper with co-author Amanda Giang, "Benefits of Mercury Controls for the United States," *Proceedings of the National Academy of Sciences* (2015).
 - a. Please explain how the United States can benefit from reductions in mercury from global sources and summarize your findings with respect to the magnitude of benefits to the United States that would result from the global agreement.

Reduction of mercury pollution from both domestic and foreign sources is needed to protect the U.S. because mercury deposition in the U.S. originates from both domestic and foreign sources. In some parts of the U.S., such as some of the Northeast, most mercury deposition comes from domestic sources. However, in other regions of the U.S. such as the West and the Southeast, most mercury deposition comes from international sources. People in the U.S. also consume imported fish (for example, fish from the Pacific Ocean) that contains methylmercury originating from elsewhere. Thus, mercury emissions in other parts of the world affect people in the U.S.

Our study (Giang and Selin, 2016) calculated that benefits to the U.S. from the Minamata Convention would be more than twice those projected from domestic policy. The monetized annual benefit for MATS we calculated was \$3.7 billion. We estimated \$8.4 billion in annual benefits to the U.S. for reductions expected from other countries' actions under the Minamata Convention. This underscores the importance of global action in addressing the mercury exposure of the U.S. population.

However, we also calculated that the MATS standards have a larger benefit than the Minamata Convention for those Americans who primarily consume fish caught locally rather than imported fish.

Citations:

Giang, A. and Selin, N.E., 2016. *Benefits of mercury controls for the United States. Proceedings of the National Academy of Sciences*, 113(2), pp.286-291.

- b. In your opinion, could a change to the MATS rule have an impact on whether other countries meet their obligations under the Minamata Convention to reduce global sources of mercury?

The United States is a party to the Minamata Convention, and has been a leader in global efforts to address mercury pollution. Actions by the U.S., such as MATS, demonstrate that reducing mercury emissions is both beneficial and feasible across the world. U.S. action plays an important role in setting global standards for emission control technology, especially for mercury emissions from power generation, the focus of the MATS rule. For example, information about

Dr. Noelle Eckley Selin
Page 2

U.S. experience with controlling mercury from the power sector is extensively cited in the guidance on best available techniques for mercury control developed under the Minamata Convention. The existence of the MATS standard in the U.S. thus encourages other countries to take meaningful actions to reduce mercury.

- c. Could the benefits to the United States that you summarize in your 2015 paper be put at risk if there was a change to the MATS rule?

The benefits (now and in the future) to the U.S. from both domestic and international action on mercury would indeed be put at risk if the MATS rule were rolled back. Fewer controls on domestic mercury emissions would allow more mercury emission. This would reduce the benefits of domestic action, and would lessen pressure on other countries to take corresponding actions. Mercury emissions continue to affect populations for decades to centuries, and thus the impact of changes to MATS could be long-lasting.

**Committee on Energy and Commerce
Subcommittee on Oversight and Investigations**

**Hearing on
“Undermining Mercury Protections: EPA Endangers Human Health and the
Environment”**

May 21, 2019

Mr. Adam R.F. Gustafson, Partner, Boyden Gray & Associates PLLC

The Honorable Brett Guthrie (R-KY)

1. During the hearing, Representative Griffith asked you questions about ancillary costs, or co-costs, of a proposal and whether an Agency should consider co-costs when the Agency considers the co-benefits of a proposal. You answered that it is important for an Agency to consider corresponding co-costs when the Agency is considering co-benefits of a proposal, and that the EPA did not consider co-costs in the 2016 Supplemental Finding entitled “Supplemental Finding That It Is Appropriate and Necessary to Regulate Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units.” Is that correct?

Yes. EPA’s 2016 Supplemental Finding did not attempt to quantify the co-costs of the Mercury and Air Toxics Standards (MATS) Rule. By “co-costs,” I mean the broader social costs of regulation apart from the direct costs incurred by regulated entities to comply with the rule. In the context of the MATS Rule, co-costs include consequences like jobs lost as a result of power plant closures and businesses that would close or relocate as a result of higher energy prices. EPA’s 2016 Supplemental Finding relied on its quantification of particulate matter co-benefits to conclude that the MATS Rule was “appropriate and necessary,”¹ but it did not quantify any of the rule’s corresponding ancillary costs. EPA’s Regulatory Impact Analysis (RIA) did acknowledge that the MATS Rule would have co-costs like plant closures and higher energy prices.² But EPA did not attempt to quantify co-costs even though it quantified the projected co-benefits of the rule. As a result, EPA’s analysis undervalued the costs of the MATS Rule relative to the Rule’s benefits.

- a. Were co-costs for the Mercury and Air Toxics Standards (MATS) rule evaluated at any point during the rule-making process, such as in the Regulatory Impact Analysis (RIA) for the MATS rule?

¹ See *Supplemental Finding That It Is Appropriate and Necessary To Regulate Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units*, 81 Fed. Reg. 24,420, 24,427 (Apr. 25, 2016).

² EPA, *Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards* 3-17, 3-22 (Dec. 2011) (MATS RIA), <https://www3.epa.gov/ttn/ecas/regdata/RIAs/matsriafinal.pdf>.

Mr. Adam R.F. Gustafson
Page 2

No. EPA did not evaluate co-costs at any point during the rule-making process.

In the MATS Rule's RIA, EPA's quantification of costs was limited to the "annual incremental compliance cost" of complying with the Rule—\$9.4 billion in 2015.³ That includes "the amortized cost of capital investment" in new pollution controls, "the ongoing costs of operating additional pollution controls," and other costs of regulated entity "actions associated with compliance."⁴ In other words, this \$9.4 billion figure includes only the direct costs for the firms that have to comply with the MATS Rule.

The \$9.4 billion figure does not include, for example, the broader costs to local communities from plant closures. These costs are not insubstantial: EPA estimated that 4.7 GW of coal-fired capacity would retire by 2015 as a result of the MATS Rule.⁵ It also does not include the costs to businesses and consumers from higher electricity prices. Again, those costs are not insubstantial: EPA estimated that by 2015 electricity prices would be on average 3.1% higher as a result of the MATS Rule (and even higher in regions that rely on coal).⁶

- b. Why, in your opinion, should corresponding co-costs be considered by an Agency if the Agency is considering co-benefits?

An analysis that weighs co-benefits but ignores corresponding ancillary costs will overestimate the relative benefits of a rule. In some situations, the social costs of regulation can be orders of magnitude higher than the direct costs of compliance, so compliance costs are often a poor proxy for the real costs of regulation. That is why EPA's own guidelines for preparing cost-benefit analysis say that "it is only in cases where the regulation is not expected to significantly impact the behavior of producers and consumers that compliance costs can be considered a reasonable approximation of social cost."⁷

The MATS Rule, with its large effect on energy prices and local economies, has significant impacts on the behavior of energy producers and consumers alike. Failing to quantify co-costs of the rule therefore undercounts the social costs of

³ MATS RIA at 3-13.

⁴ *Id.*

⁵ MATS RIA at 3-17.

⁶ *Id.* at 3-22.

⁷ Guidelines for Preparing Economic Analysis 8-14 (Dec. 17, 2010), <https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses>.

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the MATS Rule relative to its co-benefits, leading to an inflated assessment of the Rule's net benefits.

- c. If co-benefits are used to justify a rule, is it typical for co-costs to also be considered when justifying the rule? Why or why not?

For the legal reasons discussed below, it should be the norm for agencies to consider the indirect costs of regulation to the same extent that they consider co-benefits. But in my experience, it is not uncommon for EPA to neglect to quantify the co-costs of a rule even while EPA goes to great lengths to estimate the rule's co-benefits. EPA invests in complex models that allow it to quantify the co-benefits of its rules and promote the Agency's regulatory mission, but EPA seems to have been less inclined to invest in quantifying the social costs of its rules.

- d. In your opinion, when should co-costs and co-benefits be used to justify a proposal and when should they not be used to justify a proposal?

Under Executive Order 12,866, the White House requires Executive Branch agencies to consider ancillary costs and benefits of all significant rules, and to quantify those co-costs and co-benefits "to the extent feasible."⁸ The relevant co-costs include "any adverse effects on the efficient functioning of the economy, private markets (including productivity, employment, and competitiveness), health, safety, and the natural environment."⁹ With this range of indirect costs and benefits in view, the Executive Order requires agencies to regulate "in the most cost-effective manner to achieve the regulatory objective."¹⁰

Likewise, the White House Office of Management and Budget's Circular A-4 provides that agencies should, if feasible, quantify *both* "expected undesirable side-effects and ancillary benefits."¹¹

It would be irrational and contrary to these Executive Branch authorities for an agency to weigh co-benefits without weighing co-costs to the same extent. Without attempting a general theory of the array of co-costs and co-benefits that should be included in such an analysis, it is sufficient to point out that the more attenuated and contingent the co-benefits an agency weighs, the more important it is that corresponding indirect co-costs be included in the analysis. To include

⁸ E.O. 12,866 § 6(a)(3)(C)(i), (ii). Elsewhere the Executive Order requires agencies to use quantifiable measures "to the fullest extent that these can be usefully estimated." *Id.* § 1(a).

⁹ *Id.* § 6(a)(3)(C)(iii).

¹⁰ *Id.* § 1(b)(5).

¹¹ Circular A-4, https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/.

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highly speculative co-benefits while excluding fairly certain co-costs would be arbitrary and capricious.

In addition to these Executive-Branch requirements, Congress may by statute set other requirements for regulation. In *Michigan v. EPA*, the Supreme Court interpreted section 112's "appropriate and necessary" standard to require consideration of both costs and benefits, because "[n]o regulation is 'appropriate' if it does significantly more harm than good."¹² The relevant costs "include[] more than the expense of complying with regulations; any disadvantage could be termed a cost." When considering co-costs, it is reasonable for EPA to consider corresponding co-benefits, but the Agency must take care to avoid double-counting or inflating co-benefits, as it did in the 2016 Supplemental Finding by counting fine particulate matter reductions that are already required under a different provision of the Clean Air Act.

The Honorable Michael C. Burgess, M.D. (R-TX)

1. Everyone at the hearing acknowledged the severe impact many mercury compounds can have on public health. As a licensed obstetrician, I am acutely aware of the damage mercury can have on pregnant mothers and infants. Furthermore, no one at the hearing claimed that the Environmental Protection Agency (EPA) does not have the authority to regulate Hazardous Air Pollutants, as outlined by Section 112 of the Clean Air Act. What *is* at question is the ability of a federal agency to regulate industry without properly evaluating the cost-to-benefit of such regulations.
 - a. The EPA estimates that the benefits of reductions in hazardous air pollutants to be up to \$6 million dollars annually and the costs of this regulation is up to \$9.6 billion dollars annually. How often do federal agencies enforce regulations greater than a thousand times costlier than its benefits?

It is very rare for an agency to impose regulatory requirements whose costs outweigh its benefits to such a degree. Unless required by law, it is not "rational, never mind 'appropriate,' to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits."¹³ Aside from this case, I am not aware of any specific instance of an agency voluntarily using broad discretionary authority like § 112 to impose a regulation with compliance costs a thousand times greater than its direct benefits. In the normal course, the Office of Information and Regulatory Affairs would block such a rule, because it would violate Executive Order 12,866's requirement of "cost-effective" regulation.¹⁴

¹² 135 S. Ct. 2699, 2707 (2015).

¹³ *Id.* at 2707.

¹⁴ Executive Order 12,866 § 1(b)(5).

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- b. Do you know of any other instances when a federal agency was able to claim that ancillary benefits (co-benefits) gave them the authority to skirt the law giving that agency the ability to promulgate such rules?

There are other examples, although none as stark as this one. For example, I represented a coalition of petitioners who challenged EPA's "Clean Power Plan" in the D.C. Circuit in part because the rule was justified (in our view improperly) based on particulate matter co-benefits. The Trump Administration has withdrawn the Clean Power Plan,¹⁵ and the D.C. Circuit never reached a decision in the case.

- c. If the EPA was willing to consider the ancillary benefits of its regulations, shouldn't it also have to consider the ancillary costs to the same regulations?

Yes. As I explain in response to 1(b), failure to consider ancillary costs results in an inaccurate picture of the net benefits or net costs of a rule. It is arbitrary and capricious for an agency to weigh a rule's indirect benefits without giving equal weight to the corresponding indirect costs of the rule.

- d. In your opinion, is this good governance?

No. Reducing pollution is a laudable goal. But it is not good governance to achieve that goal at any cost and without attending to other important societal goods. The MATS Rule sought modest environmental benefits at enormous social costs, and it did so by compromising other cherished values like the rule of law, federalism, and democratic government.

¹⁵ *Repeal of the Clean Power Plan: Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations*, 84 Fed. Reg. 32,520 (July 8, 2019).